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THE IRON TRADE REVIEW

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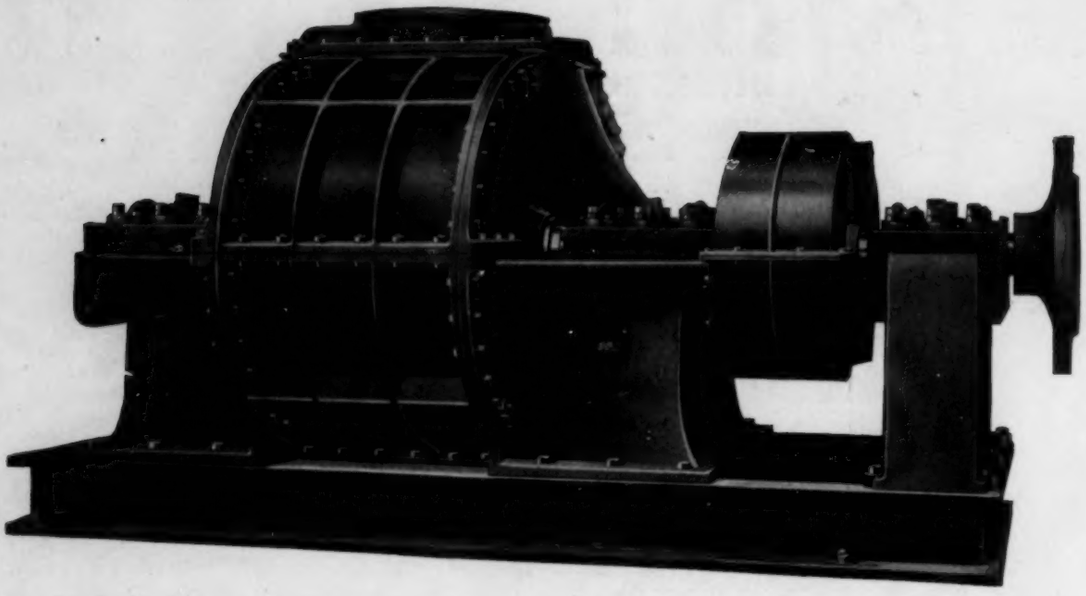

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Say you saw it in THE IRON TRADE REVIEW

THE IRON TRADE REVIEW

Vol. LXI Cleveland, November 29, 1917 *No. 22*

Works Struggle for Raw Material

Famine Condition in Steel Making Irons is Emphasized by Heavy Volume of Unclosed Inquiry—Radical Steps Taken to Alleviate Coal and Coke Shortages Which Are Menacing Whole Industry

INADEQUACY of raw material supplies is keeping the iron and steel industry in a serious plight. The virtually famine conditions in pig iron, especially in steelmaking grades, which appeared a week ago, have been accented by the flood of new inquiries now sweeping the market. It is not difficult to picture the effect on prices this excessive demand would entail were it not for the government suppression of the market. Coal and coke shortages continue a contributing factor to the undue strain upon the blast furnaces and on their own account are demoralizing the operations of steel mills, rolling mills and other industrial plants. While conditions in the Youngstown district have been ameliorated to a considerable degree, the general situation remains most unfavorable. Car supply in the Connellsville regions is hovering around 50 per cent. The grave aspects of the present difficulties of the industry have been driven home to the government. The extraordinary measures required for relief are reflected in the radical plans now in effect for unified traffic control, to include the pooling of all railroad cars and trackage east of Chicago.

Basic Iron Very Short

The demand for basic iron especially is intense. This grade is being sought in all directions and buyers do not hesitate to go far outside their usual latitude to get metal, thereby paying an increased price. Orders for thousands of tons virtually are going begging because the furnaces have little unsold iron for the position desired. Furthermore, they are unable to gage future production by normal standards, owing to the uncertainties over coke. Even tonnage to cover government orders is difficult to place, as is shown by the experience of a Pittsburgh steelmaker seeking 5000 tons of prompt iron. Washington was obliged to intercede in behalf of this requirement. The probable purchases of basic and bessemer of a leading Pittsburgh steelmaker, if the metal were available, are placed at 50,000 to 75,000 tons at least. Pending inquiry at Pittsburgh for delivery by July 1 totals 150,000 tons or more. Other grades are in only slightly less spectacular demand than basic. The buying of Steel corporation subsidiaries continues to attract attention. The American Bridge Co. has enlarged its purchase of eastern basic to 25,000 tons. The American Steel & Wire Co. has bought several thousand tons of steelmaking grades for Worcester and is negotiating for 4000 to 5000 tons of bessemer. The National Tube Co. and the American Sheet & Tin Plate Co. are in the market.

Won't Stifle Industries

A more liberal attitude toward certain classes of iron and steel demand which come under nonessentials of war is being shown by the government and by the producers. War requirements continue to be made paramount and nothing will be allowed to interfere with them. At the same time there is a clearer appreciation of the importance of maintaining established industries and of the fact that the country's great productive capacity will permit the absorption of a huge tonnage of iron and steel after the peak of initial war preparations has been passed. The passenger automobile industry is one of those destined to receive consideration. These buyers continue to seek concessions from the mills in the way of suspensions and extensions of tonnage under contract. The nut, bolt and rivet makers have made little progress in their efforts to induce the mills to rewrite steel contracts.

Active demand for semifinished material, especially sheet bars, has continued to develop as sheet and tin plate makers have extended their booking for 1918 delivery. Sheet bar inquiries at Pittsburgh have exceeded 50,000 tons. A northern Ohio sheet mill wants up to 25,000 tons. Some steel plants which normally market large tonnages are taking on little or no semifinished orders because they are short of metal for their own needs. Tin plate and sheet tonnages for next year continue to be allotted in accordance with the intended use. There is a growing inquiry for steel bars and other forms for first quarter needs.

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EDITORIAL

Backing Up a Weakened Line

EXTRAORDINARY conditions usually require extraordinary remedies. The iron and steel industry now is witnessing the application of this principle in the proposal brought out the past week by the railroad war board to pool all railroad lines east of Chicago into one centralized system. This plan, it is hoped, will produce a maximum of traffic efficiency.

None of the causes or conditions which have brought about this drastic and unprecedented procedure has been more potent than the shortage of coal and coke which have become an acute menace to iron and steel production and other branches of manufacture essential to the conduct of the war. The futility of attempting to operate blast furnaces and steel works to the maximum capacity sorely needed in the present emergency, has been becoming more pronounced each week recently as freight congestion has grown more acute. Many blast furnaces either are banked and therefore are nonproductive, or are operating so erratically that both their output and the quality of their product have been reduced. Steel works are suffering in a similar manner both from shortages of pig metal and from poor working conditions such as the use of inferior coal in making producer gas with the resultant deleterious effect upon the steel. The serious coal and coke conditions affecting the iron and steel industry largely may be ascribed to the traffic situation. Statistics show that coal production in the country is greater than ever before, but neither the cars nor the locomotives are available to handle it with dispatch. No clearer example of the inability of the railroads of the country under individual management to measure up to the load on the basis of their present facilities, could be shown.

The operating situation in the leading industrial districts during the past several weeks has grown almost intolerable. It has been made clear that nothing but drastic methods could be expected to be able to cope with the situation.

The proposal to pool the railroads in one general system to be operated under government direction may be regarded as a logical development of an extraordinarily unfavorable set of circumstances which have called for nothing short of abnormal policies. There will be many, no doubt, who will look upon the centralized operation of railroad under federal control as a dangerously long step in the direction of government ownership. It is, however, a much less radical step than would have been the case eight months ago. The railroads' war board gradually has been bringing the transportation lines of the country under co-operative supervision, and has been doing this in behalf of the government. The trend of war management in this country now manifestly is toward the concentration of authority in a few hands because it has been made clear that greatest efficiency is to be attained in that way.

The proposed pooling system, to all intents and purposes, is an unprecedented move toward closer affiliation of the railroads and the government with all the consequences of ill or good that the union implies. There seems to be no question that the railroads need all the financial and upbuilding support at the present time that the country can give them. The government by lending the depleted systems the benefit of its credit is in a position to render sorely needed aid in the quickest possible time which is most essential. It is not too much to hope that the closer the duly vested representatives of the government come to the direct responsibility for the 100 per cent operation and maintenance of the railroads, the more appreciative they will be of the pressing needs and difficulties of the latter. The apparent physical advantages to the railroads in their present rather helpless condition of this close participation of the government in their affairs, it would seem, will greatly offset the danger of their becoming immeshed in any permanent scheme of public ownership.

1917 Record of Lake Fleet

THIS week marks the close of the regular season of navigation on the Great Lakes. Regular insurance rates expire at midnight on Friday, Nov. 30. Many boats will remain in commission during the first half of December, and the amount of freight that will be moved in the next two weeks will be heavy. Last year when iron ore shipments were greater, and the need for additional tonnage less than at this time, more than one million tons were moved during December.

Despite the serious handicap under which lake boats have labored since the first of the season, owing to the severity of ice conditions which delay the opening of navigation, this efficient fleet of freight carriers has moved an immense tonnage of ore, coal and grain. Ore shipments will run over 60,000,000 tons—a figure which with proper distribution insures capacity operations during the winter

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EDITORIAL

at all blast furnaces tributary to the Great Lakes.

With the centralized control which will be exerted over lake commerce next year, the prospect for a similarly satisfactory record in 1918 is encouraging.

A Chance to Show Co-operation

BLAST furnace interests of the country are giving extremely poor support to the committee on lake coal and ore movement. This committee, headed by George L. Peck, fourth vice president of the Pennsylvania Lines West of Pittsburgh, has almost pleaded with the furnaces to send full reports each week regarding the supplies of raw materials they have on hand. This committee is an authorized agent of the government. Its purpose is to learn the raw material requirements of the furnaces and wherever possible to arrange traffic conditions, so that shortages may be overcome as nearly as possible. Plainly, the committee is working faithfully for the benefit of both the government and the furnace interests throughout the country.

Of the 410 furnaces which the committee has listed for reporting, only about 60 per cent have been responding. It appears to have been the tendency of those who really do not need any help, or think it cannot be given in the case it is needed, not to report. The committee can and will help the furnaces. It is apparent that under present extremely congested conditions of traffic, service far from satisfactory only can be obtained, but these reports can be made the basis of plans for improvement. In this connection attention might be directed to the fast shift that is being made from beehive to by-product coke. Coal for the latter eventually will come in great quantities from the Kentucky fields. Present railroad service to and from those fields is utterly inadequate in proportion to what future requirements will demand. These requirements cannot be arranged for in advance as they should be, unless furnaces give the committee information more fully than at present they are doing as to what their raw material requirements are, and what their current stocks amount to.

The blast furnaces should manifest more interest than they show at present and should respond more generously to the request of the committee for full information. In doing so, they will be helping to make easier their own position under present embarrassments and will be doing their part in the general scheme of co-operation in war effort of which we are hearing so much.

Present Importance of Waterways

WHEN the postponed convention of the National Rivers and Harbors congress, which was scheduled for Washington next month, is finally held, a movement will be crystallized which will be worthy of the careful consideration of every shipper of iron and steel in the United States. An effort will be made at this meeting to bring about a co-operation of civic organizations and shippers whereby the waterways of the country will be brought into fuller use, thus supplementing the work of the railroads, which has become a burden too great for them to handle in its entirety with their present facilities. This plan suggests itself as one which would tend not only to relieve greatly the present traffic congestion, but one which should prove a tremendous step toward forehandedness if the channels of traffic in this country are to be kept clear.

At present the railroads are at the highest point of efficiency of their career. Yet a leading authority points out that, even if the railroads at this time were to attain a 100 per cent efficiency, there still would remain perhaps 30 per cent of traffic which they would be unable to handle. With the war making continually increasing demands upon the transportation facilities of the steam lines, the importance of the waterway movement assumes greater proportions. Nor must the vital fact be overlooked that too much dependency should not be placed on one method of transportation.

Unquestionably much can be done toward utilizing the country's waterways for freight haul. Recently the Keystone Steel & Wire Co., Peoria, Ill., received a shipment of pig iron by inland waterways from Sheffield, Ala., the distance covered being about 680 miles. Although the cost of this experiment cannot well be determined until two or three trips have been made, as there was considerable initial expense involved, it is assured that the shipment was a success, financially as well as otherwise, and that the company plans for the further transportation of pig iron in this way. This is only an instance of what might be done, and the acuteness of present traffic conditions warrants the deepest consideration be given by the iron and steel industry to this subject. The point cannot be too greatly emphasized that the fundamental purpose of the coming meeting is not to urge large appropriations for new projects, but simply to bring about a concerted campaign toward using to the fullest extent the facilities already afforded.

Iron and Steel Prices

Corrected to Wednesday Noon

SCRAP, WAREHOUSE AND IRON ORE PRICES ON 1186

PIG IRON

Bessemer valley	$36.30
Bessemer, Pittsburgh	37.25
Basic, Pittsburgh	33.95
Basic, eastern Pa.	33.00
Basic, Buffalo	33.00
Malleable, Pittsburgh	34.45
Malleable, Chicago	33.50
Malleable, Philadelphia	37.00 to 37.50
Malleable, Buffalo	33.50

GOVERNMENT SCHEDULE

1.75 to 2.25 silicon (No. 2 foundry, No. 2 plain, and No. 3 southern)	$33 furnace base
2.25 to 2.75 silicon (No. 2X, No. 1 Northern foundry, and No. 2 southern)	base plus 50c
2.75 to 3.25 silicon (No. 1X, No. 2 soft)	base plus $1.50
Over 3.25 silicon	$34.50, plus $1.00 for each ½ per cent of silicon.

No. 1X, Phila.	35.00 to 35.25
No. 2 foundry, Pittsburgh	33.95
No. 2 foundry, Cleveland	33.95
No. 2 foundry, Ironton	33.00
No. 1 foundry, Chicago	33.50
No. 2 foundry, Chicago	33.00
No. 2X foundry, Phila.	34.00 to 34.25
No. 2X foundry, N. J. tide	34.25 to 34.50
No. 2X foundry, Buffalo	33.50
No. 2 plain, Philadelphia	33.50 to 33.75
No. 2 plain, N. J. tide	33.75 to 34.00
No. 2 southern, Birmingham	33.00 to 33.50
No. 2 southern, Cincinnati	36.40
No. 2 southern, Chicago	37.50
No. 2 southern, Phila. del.	38.30 to 39.40
No. 2 southern, Cleveland	37.50
No. 2 southern, Boston	39.50
No. 2 southern, St. Louis	35.90
Virginia, No. 2X, furnace	33.50
Virginia, No. 2X, Phila.	36.77
Virginia, No. 2X, Jersey City	37.02
Virginia, No. 2X, Boston	37.27
Silveries, 8 per cent, furnace	46.00
Silveries, 8 per cent, Chicago	48.54
Low phos. standard, Phila.	55.00 to 56.00
Low phos. Lebanon furnace	50.00
Low phos., Pittsburgh	53.00
Charcoal, Superior, Chicago	37.50
Charcoal, Superior, Buffalo	39.75
Charcoal, southern, furnace	43.00

COKE

(At the ovens.)

Connellsville furnace	$6.00
Connellsville foundry	7.00
Wise county furnace	6.00
Wise county foundry	7.00
Pocahontas furnace	6.00
New River foundry	7.00
New River furnace	6.00

FERRO ALLOYS

Ferromanganese delivered	$225.00 to 250.00
Spiegel, 20 per cent fur.	60.00 to 65.00
Ferrocarbon titanium, carloads, maker's plant	160.00
Ferrosilicon, 50 per cent, Pittsburgh	150.00 to 160.00
Ferrosilicon, 50 per cent, Pitts., 1st quarter	130.00 to 150.00
Bessemer ferrosilicon, 9 per cent.	$51.70
Bessemer ferrosilicon, 10 per cent.	55.00
Bessemer ferrosilicon, 11 per cent.	58.30
Bessemer ferrosilicon, 12 per cent.	61.60

Ferrosilicon prices at Ashland, Ky., Jackson and New Straitsville, O.

SEMIFINISHED MATERIAL

BILLETS

Open hearth, Pittsburgh	$47.50
Open hearth, Philadelphia	50.50
Open hearth, Youngstown	47.50
Bessemer, Pittsburgh	47.50
Bessemer, Youngstown	47.50
Forging, Pittsburgh	60.00
Forging, Philadelphia	63.00

SHEET BARS

Open hearth, Pittsburgh	$51.00
Open hearth, Youngstown	51.00
Bessemer, Pittsburgh	51.00
Bessemer, Youngstown	51.00

WIRE RODS AND SKELP

Wire rods, Pittsburgh	$57.00
Grooved skelp, Pitts.	2.90c
Sheared skelp, Pitts.	3.25c

SHAPES, PLATES AND BARS

(In cents per pound)

Structural shapes, Pitts.	3.00c
Structural shapes, Phila.	3.185c
Structural shapes, N. Y.	3.195c
Structural shapes, Chicago	3.00c
Tank plates, Chicago	3.25c
Tank plates, Pittsburgh	3.25c
Tank plates, Philadelphia	3.435c
Tank plates, New York	3.445c
Bars, soft steel, Pittsburgh	2.90c
Bars, soft steel, Chicago	2.90c
Bars, soft steel, New York	3.095c
Bars, soft steel, Phila.	3.085c
Bar iron, Chicago	3.50c
Bar iron, Philadelphia	3.685c
Bar iron, Cleveland	3.64c
Bar iron, New York	3.695c
Bar iron, Pittsburgh	3.50c
Hard steel bars, Chicago	3.25c
Cotton ties, Pitts., Nov.	$2.15

RAILS, TRACK MATERIAL

Angle bars, Pittsburgh, base	3.75c to 4.00c
Angle bars, Chicago, base	3.25c to 4.00c
Standard bessemer rails, mill	$38.00
Stand. open hearth rails, mill	40.00
Light rails, 25 to 45, mill	3.00c
Relaying rails, light, St. L.	75.00 to 80.00
Spikes, railroad, Pittsburgh	4.50c to 5.00c
Spikes, railroad, Chicago	5.00c to 5.25c
Track bolts, Pittsburgh	6.50c to 8.10c
Track bolts, Chicago	5.25c to 6.50c
Tie plates, Chicago	$70.00 to 75.00

WIRE PRODUCTS

(Per 100 lbs. to jobbers; retailers 5c more)

Wire nails, Pittsburgh	$3.50
Coated nails, Pittsburgh	3.45
Plain wire, Pittsburgh	3.25
Galvanized wire, Pittsburgh	3.95
Polished staples, Pittsburgh	3.65
Galvanized staples, Pittsburgh	4.35
Barb wire, painted, Pittsburgh	3.65
Barb wire, galvanized, Pitts.	4.35
Cut nails, Pittsburgh	....

CHAIN, PILING, STRIP STEEL

(In cents per pound)

Chain, ⅜ in. proof coil, Pitts.	8.00c

Sheet piling, base, Pittsburgh 4.00c to 5.00c

Cold rolled strip steel, hard coils, 1⅛ inches and wider by 0.100 inch and heavier, base per 100 pounds, 6.50c.

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SHEETS

(In cents per pound.)

SHEET MILL BLACK

No. 28, open hearth, Pitts.	5.00c
No. 28, bessemer, Pitts.	5.00c
No. 28, open hearth, Chic.	5.215c

TIN MILL, BLACK

No. 28, open hearth, Pitts.	5.00c
No. 28, bessemer, Pitts.	5.00c

GALVANIZED

No. 28, open hearth, Pitts.	6.25c
No. 28, bessemer, Pitts.	6.25c
No. 28, open hearth, Chic.	6.465c

BLUE ANNEALED

No. 10, open hearth, Pitts.	4.25c
No. 10, bessemer, Pitts.	4.25c
No. 10, open hearth, Chic.	5.715c to 6.215c
No. 10, open hearth, Phila.	4.435c

TIN PLATE

(Per 100 lb. box)

Tin plate, coke base, Pittsburgh $7.75

IRON AND STEEL PIPE

Base Pittsburgh

Base Pittsburgh	Black Per cent off	Galv. Per cent off
¼ to 3 in., butt, steel	51	37½
¼ to 3 in., butt, iron	33	17

BOILER TUBES

Steel, 3½ to 4½ inches, l. c. l.	30
Iron, 3½ to 4½ inches, c. l.	12½

CAST IRON WATER PIPE

(Class B Pipe.)

Four-inch, Chicago	56.50
Six-inch and over, Chicago	53.50
Four-inch, New York	57.50
Six-inch and over, New York	54.50
Four-inch, Birmingham	48.00
Six-in. and over, Birmingham	45.00

Class A pipe is $1 higher than Class B.

HOOPS, BANDS, SHAFTING

Hoops, Pittsburgh	3.50c
Bands, Pittsburgh	2.90c
Shafting, Pittsburgh, carloads	17 off to list

RIVETS

Structural rivets, Pittsburgh	4.65c
Boiler rivets, Pittsburgh	4.75c
Rivets ⅞ in. and smaller, Pitts.	45 and 10 off

NUTS AND BOLTS

(Delivered within 20-cent freight radius.)

CARRIAGE BOLTS

(⅜ x 6 inches, smaller and shorter)

Rolled thread	50–5 off
Cut thread	40–10–5 off
Larger and longer	40 off

MACHINE BOLTS

(⅜ x 4 inches, hot pressed nuts)

Rolled thread	50–10–5 off
Cut thread	50–5 off
Larger and longer	40–10 off
Cold pressed semi-finished hexagon nuts ⅝ in. and larger	60–10–10 off
Cold pressed semi-finished hexagon nuts ⅞ in. and smaller	70–5 off
Gimlet and cone point lag screws	50–10 off

NUTS

Hot pressed, square blank	2.50c off
Hot pressed, square tapped	2.30c off
Hot pressed, hexagon blank	2.30c off
Hot pressed, hexagon tapped	2.10c off
Cold pressed, square blank	2.25c off
Cold pressed, square tapped	2.00c off
Cold pressed, hexagon blank	2.25c off
Cold pressed, hexagon tapped	2.00c off

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago.)

Quotations on leading products November 28, average for October, 1917, average for August, 1917, and average for November, 1916. Prices are those ruling in the largest percentage of sales at the dates named

	Prices Nov. 28, 1917.	Average prices Nov., 1917.	Aug. 1917.	Nov., 1916.
Bessemer pig iron, Pittsburgh..	$37.25	$37.25	$55.55	$30.35
Basic pig iron, Pittsburgh.....	33.95	33.95	52.75	25.95
*No. 2 Foundry pig iron, Pitts.	33.95	33.95	55.55	26.76
*No. 2 Foundry pig iron, Chic.	33.00	33.00	55.00	25.00
Lake Superior Charcoal, Chicago	37.50	37.50	59.50	21.95
Malleable, Chicago	33.50	33.50	55.00	25.00
**Southern, No. 2, Birmingham.	33.00	33.00	48.00	22.00
*Southern Ohio No. 2, Ironton.	33.00	33.00	55.00	30.00
Basic, eastern Pa.....	33.00	33.00	51.00	25.00
**No. 2X Virginia, furnace....	33.50	33.50	51.90	23.00
**No. 2X foundry, Philadelphia.	34.00	34.00	53.40	25.00
Ferro mang., delivered.....	235.00	302.00	400.00	160.00
Bessemer billets, Pittsburgh....	47.50	58.75	93.00	52.00
Bessemer sheet bars, Pittsburgh	51.00	65.50	96.00	52.00
Open hearth sheet bars, Pitts..	51.00	65.50	96.00	52.00
Open hearth billets, Pittsburgh.	47.50	58.75	93.00	52.00
Steel bars, Pittsburgh.....	2.90	2.90	4.00	2.78
Steel bars, Chicago.....	2.90	2.90	4.50	2.90
Iron bars, Philadelphia.....	3.685	4.935	4.914	2.659
Iron bars, Cleveland.....	3.64	4.50	4.75	2.70

*1.75 to 2.25 silicon. **2.25 to 2.75 silicon.

	Prices Nov. 28, 1917.	Average prices Nov., 1917.	Aug. 1917.	Nov., 1916.
Iron bars, Chicago mill.....	$3.50	$4.50	$4.50	$2.52
Beams, Chicago	3.00	3.00	4.95	3.00
Beams, Pittsburgh	3.00	3.00	4.50	2.88
Beams, Philadelphia	3.185	3.185	4.914	3.059
Tank plates, Pittsburgh.....	3.25	3.25	8.80	3.35
Tank plates, Chicago.....	3.25	3.25	9.60	3.45
Tank plates, Philadelphia.....	3.435	3.435	10.164	3.909
Sheets, blk., No. 28, Pittsburgh	5.00	7.75	9.00	3.67
Sheets, blue anld., No. 10, Pitts.	4.25	7.855	8.50	3.30
Sheets, galv., No. 28, Pittsburgh	6.25	8.815	10.25	5.07
Wire nails, Pittsburgh.....	3.50	3.90	4.00	2.85
Connellsville fur. coke.....	6.00	6.00	10.00	3.75
Connellsville fdy. coke.....	7.00	6.00	12.50	5.50
Heavy melting steel, Pittsburgh	30.00	31.50	34.60	20.55
Heavy melting steel, eastern Pa.	27.00	26.10	32.80	20.00
Heavy melting steel, Chicago...	28.50	27.00	33.10	19.35
No. 1 wrought, eastern Pa.....	35.00	40.80	46.24	23.50
No. 1 wrought, Chicago, net ton	31.00	31.88	35.40	21.25
Rerolling rails, Chicago.....	35.50	36.00	41.90	24.90
Car wheels, Chicago.....	29.00	25.88	30.70	15.95

(For Additional Prices See Page 1186)

Pig Iron Famine Grows More Acute

Overwhelming Demand for Basic is Going Unsatisfied and Foundry Grades in Only Little Better Position—Propose Limiting Furnace Shipments to War Requirements—Steel Corporation Subsidiaries Are Buying Freely

Pittsburgh, Nov. 27.—Famine conditions in pig iron have grown worse. Almost frantic efforts are being made by consumers to obtain tonnages of both steelmaking and foundry grades. The most urgent demand relates to basic. It is conservatively estimated that inquiries in the Pittsburgh district involve 150,000 tons or more. Not only are producers out of the market, being unable to made offerings, but additional furnaces have been banked, owing to a shortage of fuel. There is no prospect of immediate improvement and it is not improbable that conditions will become more serious before improving in view of the obstacles to transportation during cold weather. Much interest is manifested in the proposal to pool railroad operations. It is recognized that immediate relief must be forthcoming and with this idea in mind sweeping measures are being considered informally. A pressing need of confining manufacturer to bare essentials has prompted the feeling on the part of some pig iron makers that a canvass of their contracts should be made in order to restrict shipments to those engaged in war work. This would have the effect of suspending the operations of various steel plants and manufacturing companies. Sales of iron in this district during the past week have involved comparatively small tonnages, owing to the inability of consumers to get metal. Buyers no longer are particular as to analysis. This has resulted in quantities of off-grades being taken. Four subsidiaries of the United States Steel Corp. are understood to have closed for various lots during the past two weeks. These include the National Tube Co., which bought off-basic for McKeesport; the American Steel & Wire Co., which took some eastern off-iron for Worcester, Mass.; the American Sheet & Tin Plate Co., which has been in the market for indefinite requirements and the American Bridge Co., which closed for 10,000 to 12,000 tons of basic in the east. The recent blast furnace strike of the Jones & Laughlin Steel Co. has had a marked effect in bringing about the existing shortage of iron. It is claimed that this strike curtailed the output by at least 100,000 tons. This company is seeking heavy tonnages of either bessemer or basic. Another large consumer in the Pittsburgh district is asking for 10,000 tons of basic for first half. Inquiries for foundry grades are numerous.

Corporation Subsidiaries Buying

Philadelphia, Nov. 26.—Scarcity of coke continues to aggravate the pig iron scarcity. Several eastern furnaces are operating at reduced schedules due to lack of fuel. The furnace of the Alan Wood Iron & Steel Co. is banked for this reason, and as a result this company is in the market for a considerable tonnage of basic in addition to approximately 6500 tons it recently bought. The Reading Iron Co. is ready to blow in its furnace but cannot do so because of lack of coke. Current demand is heavy for practically all grades, and principally for basic. The American Bridge Co. has taken considerable additional tonnage, making about 25,000 tons of basic and off grades purchased during the past two weeks for delivery to Pencoyd over

the next two to three months. The American Steel & Wire Co. has purchased several thousand tons in this district for Worcester and continues in the market for at least 4000 to 5000 tons of bessemer. At least two other United States Steel Corp. subsidiaries have purchased here round tonnages which had been offered to them. Much of the latter was off-basic, off-bessemer and off-foundry. Numerous inquiries for basic are out and it is difficult to tell where the iron is to come from. Eastern makers, considering their curtailed output, have more tonnage booked for first quarter than they probably can produce in that period. In addition to the inquiry from the American Steel & Wire Co., numerous tonnages of bessemer are wanted. Canadian melters especially want this grade. Several thousand tons of standard low phosphorus and some 7500 tons of copper-bearing iron were sold during the week.

Demand Far Exceeds Supply

Boston, Nov. 26.—The feature of the local pig iron market is an urgent demand and an utter lack of free supply, conditions which ordinarily would spell rapidly advancing prices. But with the government in control of the prices and the trade conforming to the fixed levels the market is steady. Inquiries for carload lots are very numerous and there are a few for 1000 tons. The long distance telephone is being worked overtime these days, for no business is being accepted without first consulting the furnace. The iron that is wanted is badly wanted and there is no question that if sellers were so inclined, they might ask and obtain substantial premiums over the government prices. Not a few furnaces have been forced to withdraw from the market for the first half of 1918; from all sections, Alabama, Virginia, eastern Pennsylvania and Buffalo, the word is that the furnaces are sold up and practically the only iron now available is a small quantity for second quarter. If the furnaces could be guaranteed supplies of coke, they might be willing to take more business, but they are obliged to bank from time to time, and it is considered the safest course not to book up to full capacity, or estimated production plus 10 per cent. It is estimated that few furnaces will turn out in the first half of 1918 more than 70 or 80 per cent of what they could do if coke conditions were normal.

Scarcity is Appearing

Chicago, Nov. 27.—Large inquiry for all grades of pig iron is being entertained in the Chicago district, but comparatively little metal remains unsold. Northern stacks are almost sold up for their entire production until July 1, 1918. This includes the production of a new furnace expected to go in during the first quarter. The inquiry includes foundry, malleable and basic and comes from a wide variety of users. The same condition seems to be present as to southern iron. Most makers in the south have informed their representatives here they have little iron remaining up to the middle of 1918. Part of this condition arises from the fact that poor fuel and irregular operation have thrown southern furnaces far back on deliveries. A heavy tonnage sold for this year will be carried over into next year, thereby reducing materially the tonnage for sale for first half. Some sales have been made during the past week of small tonnages at the government price, $33, Birmingham, carrying a $4 freight rate to Chicago. The situation as to silveries is unusually tight. Jackson county furnaces are in a bad way. Globe furnace is out for relining and the stack of the Jackson Iron & Steel Co. has developed a hot spot which is limiting output and may result in blowing out.

Can't Supply Inquiry

Buffalo, Nov. 27.—The week has been marked in this district by a heavy inquiry, which has been countered by a soldup condition making something akin to an iron famine. Six furnaces in this district or tributary to it, are now banked or out of blast thereby cutting production materially. Shortage of coke has brought this situation about. One furnace interest disposed of over 9000 tons the best selling in many months. This was all to regular consumers, and was made up of No. 2 plain and malleable grades. Extraordinary efforts are being made to obtain iron from this district, and Pennsylvania consumers are even coming here in a strong effort to get supplies. One interest endeavored to get delivery of a good tonnage for last half but was unsuccessful. Other melters seeking new sources of supply have been inquiring for 4000 to 5000 tons.

Buyers are Going Unsatisfied

St. Louis, Nov. 24.—Dealers report no change in the pig iron situation as contrasted with earlier weeks this month. There continues an excellent demand for both foundry and steelmaking grades, and a scarcity of both but especially the southern foundry product. Great difficulty is being experienced in getting producers to quote for future delivery and sales of spot are confined to a few odd cars. The disposition to loosen up a bit in northern offerings noted the preceding week has disappeared. Advices are to the effect that it may be necessary to bank or blow out more blast furnaces because of coke shortage. This would eliminate any production over that called for by contract. Producers in the St. Louis district do not appear to be suffering from lack of fuel or any other raw material but they are sold up for weeks ahead and can offer little at the moment. The principal foundry reports record production. General consumption in the district is being maintained.

Big Basic Tonnage Sought

Cleveland, Nov. 27.—Shortages of steelmaking iron have grown more pronounced during the past week. Many buyers have come into the market but have found it extremely difficult to obtain metal. As a result a large tonnage estimated at not less than 100,000, and principally of basic, has been left open before sellers. In some instances consumers have been obliged to go far outside their usual territory for supplies. Even requirements covering government work have been difficult to fill, particularly a request for 5000 tons of December basic from a Pittsburgh steel maker, the placing of which called forth intercession from Washington. Inquiries of the past week are reported by makers to have been the heaviest in this territory of any period since the fixation of prices. A northern Ohio steelmaker who bought 10,000 tons of basic for second quarter is out for 10,000 tons additional. A southern Ohio consumer wants 10,000 to 15,000 tons of first half basic and another buyer 5000 tons for December-January. The possible purchase of a leading independent Pittsburgh steelmaker, who is a prospective buyer are placed at not less than 50,000 to 75,000 tons. A new inquiry for 400 tons of special malleable for the Emergency Fleet corporation is current. A large Youngstown user wants 10,000 tons of 8 per cent silveries to be delivered at the rate of 1000 tons monthly.

Basic is in Demand

Cincinnati, Nov. 26.—The movement of iron from Birmingham territory on previous purchases is showing improvement. The reverse is the case in shipments from other districts. Producers in southern Ohio lately have been experiencing serious trouble through the short supply of cars. Only stocks on hand have prevented many foundries from being compelled to close down. Odd lots of both southern and Virginia iron can yet be had for December but most of the metal is of high sulphur

content. A number of sales of southern iron have been made for first half. Little of this has been taken by melters whose foundries are located at points taking a higher freight from Birmingham than Cincinnati. Rumors that the rate of $2.90 from Birmingham proper had been increased are without foundation, nor has there been any change as reported in the Ironton rate of $1.26 to points taking this Cincinnati rate. The inquiry for basic is increasing, most of which is from users not in this territory. Rumors that a nearby rolling mill had purchased some basic for first half cannot be substantiated, although transactions of importance are pending. One lot of 10,000 to 15,000 tons for an Ohio river interest is open. The scarcity of high silicon iron is forcing foundries to curtail the use of scrap to some extent in their mixtures. Practically no Ohio silvery iron is to be had within the next four months. All sales are being made at the government's schedule, but some southern furnaces still are uncertain about using the base price on grades below No. 2.

More Southern Selling

Birmingham, Nov. 27.—Sales of iron continue to be made in southern territory for delivery during the first half of 1918, though invariably the orders are small. Practically all furnace companies are offering a little iron. The Republic Iron & Steel Co., which was out of the market for a while, now is offering some grades. Numerous inquiries for the last half of 1918 are current. As stated before, the greater portion of the iron now leaving this district is that which was sold at prices greatly in excess of the prevailing figures. Deliveries are no better this week and the probable make is just about being handled. Furnace stocks are unchanged. Production shows some improvement and the quality of the make is better. Lagging deliveries of coke and other causes resulted in considerable off-grade iron in this district for a while. Inquiries again are noted from sections usually buying in the north and east. Some of the large consumers who placed orders here a year or so ago and since, still are maintaining representatives in this district to urge deliveries. Home consumption shows no change.

Buys Machine Plant

William Cramp & Sons Ship & Engine Building Co., has purchased the entire property of the De LaVergne Machine Co. of New York. It is understood the Cramp company will use the De LaVergne plant for the manufacture of marine engines and refrigerating machinery.

No Coke Relief in Sight

Connellsville Car Supply Remains About 50 Per Cent—Meet to Consider Plan to Pool Shipments of Furnace Fuel

Pittsburgh, Nov. 27.—Aside from a slightly freer movement of shipments, no improvement in the coke supply situation was shown during the past week. The shortage of fuel at blast furnaces continues to be extremely acute and has resulted in an additional number of stacks being banked. While various schedules have been made for the purpose of relieving the car congestion in the Connellsville regions, none of them appears to afford prospects of material relief. The proposal for pooling shipments is considered by many coke operators and blast furnace interests to be impractical. Hope is entertained that the plan of the railroads to inaugurate a vast pooling system of their equipment will bring results. The committee named at Washington to put this plan into operation will hold a meeting tomorrow in Pittsburgh to discuss the question. Most diligent efforts are being made by foundry and blast furnace operators to obtain coke, but they are meeting with only relatively little success. Unless supplies are obtained much more easily than at present, there will be a further closing down of foundries and banking of furnaces. There is a growing sentiment in favor of having the government turn over to the railroads, locomotives and cars being built for export and to at least use this equipment until it is needed behind the battle lines abroad. Moreover, the impression prevails that the government should recall skilled and semiskilled railroad employes who have been drafted for military service The coke car supply in the Connellsville regions last week averaged about 50 per cent and has not exceeded that for the present week. Practically the only bright spot in the entire situation is the freer movement of coal for by-product coke ovens. Coke production for the week ending Nov. 17 was 306,240 tons, as compared with 315,808 tons for the preceding week, according to *The Connellsville Courier.*

Foundry Sales Heavier

Cleveland, Nov. 27.—Offerings of foundry coke have been more liberal during the past week or two and a number of forward contracts have been booked. Some sellers have been booking contracts for first half, but one large interest has been closing up its trade for the full year at the agreed price of $7, Connellsville, and without any provision for subsequent revision. Considerable by-product fuel also has been sold. Offerings now are more restricted and numerous consumers still are trying to cover.

By-Product Situation Clearer

Chicago, Nov. 27.—Announcement of prices on by-product coke has cleared the atmosphere considerably in the Chicago district where by-product coke is used almost exclusively. The new schedule provides that the price quoted on by-product shall be $6, Connellsville, for furnace fuel and $7, Connellsville, for foundry fuel, plus the freight from Connellsville to the producing plant. On crushed by-product coke a price of $6.30 per ton at ovens is provided, which is 80 cents per ton less than on crushed beehive coke. The consumer pays freight transportation charges from ovens to his plant. An important producer in this territory has been ordered by the government to supply in excess of 10,000 tons per month to a gas company to prevent a disastrous shortage of fuel in this city.

Foundry Sales Made

Cincinnati, Nov. 26.—Both New River and Pocahontas operators still are out of the market and it is claimed that they are sold up through the first half. Some Wise county ovens also have all the business they can take care of for the same period but a little foundry business yet could be placed in that district. Connellsville foundry has been contracted for quite freely for next year. The operators probably could sell a much larger tonnage for the last half of next year, but are not willing to commit themselves too heavily that far ahead.

St. Louis in Good Shape

St. Louis, Nov. 24.—Coke users in the St. Louis district have not been put to any serious inconvenience as yet. All the dealers are receiving urgent appeals from widely scattered points but they have not been able to help outsiders. There are continued complaints of railroad congestion and backward deliveries from the Connellsville region, some brokers declaring they are not getting through a third of their contract orders.

Quotations on coke, St. Louis, are: Foundry, $9.95; furnace, $8.95; crushed sizes, $9.45, and gas, $8.95.

Scrap Scarcity is Growing

Supplies Are Limited Especially in Heavy Melting Steel—Pig Iron Shortages Drive Buyers Into Old Material Market

FOR COMPLETE SCRAP PRICES SEE 1186

Chicago, Nov. 27.—Shortage of almost all grades of iron and steel scrap is beginning to show itself with a consequent rise in most quotations and a decidedly stronger feeling throughout the market. A dealer recently making a trip through the west was able to obtain only three cars of country scrap in territory which ordinarily would have yielded many times this number. Busheling scrap now is almost impossible to obtain as yards are supplying shoveling steel and are neglecting busheling. No. 1 wrought is fixed at $31.25 net ton. This price is being paid to railroads at their yards, leaving no room for profit or to cover approximately 30 cents switching charge in the Chicago district. A movement is on foot for a commission to be allowed brokers handling this material. Railroad offerings are not large, although the Chicago, Rock Island & Pacific has issued a list containing 3500 tons. This includes 1000 tons of steel rail, 400 tons of No. 1 railroad cast and 300 tons of No. 1 wrought.

Railroad Pool May Help

Boston, Nov. 26.—A good business is being done in old material in this district with prices holding at the recent level. Embargoes on the railroads are interfering with shipments to some extent. The news of the pooling of the railroads east of Chicago is encouraging to the trade, who have hopes that under the new arrangement it may be possible to load a good many of the cars returning to the west, most of which now go back empty. Dealers paying prices f. o. b. shipping points per gross ton follow: Wrought No. 1 long, $28 to $29; horse shoes, $28 to $29; cotton ties, $20 to $21; stove plate, $19 to $20; No. 1 machinery, $30 to $30.50; No. 2 machinery, $28 to $29; car axles, steel, $42 to $44; iron, $49 to $50; rerolling steel rails, $50; iron boiler plate, $34 to $35; bundled barrel hoops, $17.50 to $18; wrought iron pipe, $24 to $25; steel rails, $25 to $26; No. 1 railroad steel, $25 to $26; heavy melting steel, $24 to $25; axle turnings, $18 to $19; machine shop turnings, $15 to $16; cast borings, $17 to $17.50; drop forging trimmings, $21 to $22; cast iron car wheels, $30 to $32.

Eastern Freights Raised

New York, Nov. 27.—Freight rate advances recently made on iron and steel scrap and other commodities from the east to Pittsburgh now are being applied, New York to eastern Pennsylvania. The Pennsylvania railroad has advanced from $1.90 to $2.20 its rate on scrap from New York to eastern Pennsylvania consuming points. To the new rate must be added a war tax of 3 per cent, making the total charge of $2.266. Fair activity characterizes the market. Most of the demand is for cast scrap which is wanted by local foundries having difficulty to get pig iron. Considerable heavy melting steel has been sold during the past week to the Pittsburgh district and some tonnage also has been taken by a Pottsville, Pa., consumer. Rolling mill scrap is active.

Market More Stable

Philadelphia, Nov. 26.—Greater stability now characterizes the iron and steel scrap market here than has been shown in a long time. The establishment of the maximum figures on the four principal grades has made the tendency toward fluctuations in prices less marked. Since the general market is somewhat lower than these figures, consumers do not hesitate to pay the prices that are asked. Current business is quiet and the volume only fair. Consumers, now that prices are under control, are disposed to buy material as they need it, rather than for considerable periods ahead as was the case previously. The present freight rate from Philadelphia to Pittsburgh is $3, compared with $2.56 before Aug. 20. The higher rate is expected to prevent the market on heavy melting steel in eastern Pennsylvania from exceeding $27 to $28, which is about the equivalent of $30, delivered, Pittsburgh.

Active Demand at Pittsburgh

Pittsburgh, Nov. 27.—Demand for scrap in this district exceeds the supply, according to dealers, and affects a number of grades. Inquiries for heavy melting steel especially are pressing. This is due in part to steel works calling for more scrap because of the curtailed output of pig iron. Stocks of dealers are reported to be extremely low. The Carnegie Steel Co. is understood to be in the market for a large tonnage of heavy melting steel. Sellers say that they are experiencing difficulty in obtaining supplies. It is claimed that because of the arbitrary figures set by the government on four grades, heavy melting steel, cast borings, No. 1 railroad wrought and machine shop turnings, the tendency is for material to move to the nearest consuming points and inasmuch as the Pittsburgh district is the greatest user of scrap in the country and its output is less than its consumption, the supply is restricted to a point below requirements. Railroad embargoes also are an obstacle to the free movement of shipments. Dealers are asking the government prices for the four grades on which levels were established, with conforming differentials on the remaining ones. Selling during the past week has been active and would be much greater than it is, dealers say, if they could get the material and railroad conditions would permit.

Heavy Steel is Scarce

Buffalo, Nov. 27.—Demand is heavy for all kinds of scrap in this district with a perceptible stiffening of the market for heavy melting steel, cast borings, turnings, car wheels and No. 1 railroad cast scrap. In this territory there is a real shortage of heavy melting steel and this has created a strong demand for other grades such as hydraulic compressed, No. 1 busheling and heavy turnings. The condition in heavy melting steel is so tight that offers are coming from out of town sources at a price above the fixed figures. These offers are coming from dealers who have old orders at prices higher than government prices upon which delivery expires Jan. 1. These dealers are putting forth every effort to secure the filling of orders taken at the high prices of the summer and early fall. It is almost impossible to secure equipment to make shipments of any character. Conditions are developing into a competition for every car. Prices remain unchanged.

Prices are Higher

Cleveland, Nov. 27.—No. 1 railroad wrought and heavy melting steel now are within 50 cents of the government maximum of $35 and $30, delivered, respectively. Heavy melting steel is quoted at $28.50 to $29.50, an advance of $1, and No. 1 railroad wrought at $33.50 to $34.50, an advance of 50 cents. Machine shop turnings and cast borings, still are quoted at $18 to $18.50. Two other grades are quoted slightly higher. Hydraulic pressed sheets, which were $24 to $24.50, are $24.50 to $25; No. 1 busheling has been raised from $25 to $25.75 to $25.75 to $26.75. The other items on the list are substantially unchanged. The increases are largely sentimental, as trading is not especially

heavy, except among dealers. Demand is mainly for emergency and filling in needs. Embargoes continue to interfere with deliveries. Scrap dealers of the Cleveland district met this evening to formally organize a local branch of the iron and steel scrap inspection bureau of the American Board of Scrap Iron Dealers, which has headquarters at Philadelphia.

Embargoes Check Market

Cincinnati, Nov. 26.—Scrap transactions are fewer and outbound shipments are very much hindered by the railroad embargoes. No improvement is shown by local quotations on heavy melting steel or borings or turnings. No. 1 railroad wrought is not in demand because it cannot be moved to the great consuming centers but the nominal price is close to the government's figure of $35 per gross ton less the Pittsburgh rate of freight. Nearby foundries not well supplied with cast scrap are only buying from hand to mouth.

1918 Contracts

In Tin Plate Being Taken by Makers Requirements to be Heavy

Pittsburgh, Nov. 27.—Bookings for 1918 are being taken by tin plate makers. Tonnages are being allotted and it is hoped to be able to take good care of all consumers. This can be done in the event that mills are able to secure sufficient supplies of steel, palm oil and pig tin. There is considerable doubt, however, as to whether they will be able to do this. The theoretical capacity of the tin plate mills of the United States is 38,000,000 boxes annually, but just what the actual output for 1918 will be cannot be determined at this time. Requirements of the government in connection with its food conservation program, together with the demand for export to the allies, aggregate an enormous total Contracts being taken by the American Sheet & Tin Plate Co. for 1918 are for first half delivery.

Reselling Cinder

Philadelphia, Nov. 26.—Numerous consumers are refusing to take in mill cinder due them on contracts closed last January, and as a result considerable cinder is being offered at resale. This material is refractory and much fuel is required to melt it. The shortage of coke at present makes cinder undesirable and it has been difficult to sell all this year. Present offerings are on the basis of $2.50 to $3, delivered.

The Interstate Iron & Steel Co., Chicago, has a service flag containing 66 stars in its main office.

Sheet Bar Demands Heavy

Pittsburgh Inquiries Exceed 50,000 Tons—Ohio Buyer Wants 25,000 Tons—Chicago Takes 70,000 Tons of Shell Billets

Pittsburgh, Nov. 27.—Inquiries involving large tonnages of sheet bars have come to mills in the greater Pittsburgh district during the past week. Most of the buyers want the tonnage for prompt and first quarter delivery. A tin plate maker is seeking 2000 tons a month for the first six months of 1918. Mills are compelled to decline prompt business, owing to their heavy obligations on contracts and will not open their books for 1918 until next month. The same situation regarding the sold-up condition of sheet bar mills, their inability to take tonnages and the opening of books applies to billet manufacturers. The demand for billets, however, is much lighter than it is for sheet bars. It is estimated that at least 50,000 tons of sheet bars are represented by inquiries to mills in the Greater Pittsburgh district during the past week. The position of the mills is made exceptionally difficult by reason of the scarcity of steel which is partly due to the curtailed output of pig iron.

One-Pounder Tonnage Closed

New York, Nov. 28.—Additional shell steel orders from the government are now being allotted among the various makers. An order for 6,500,000 1-pound shells has been placed. Other orders for various sizes of shells are about to be distributed.

Makers Retain Their Steel

Philadelphia, Nov. 26.—Shortage of raw steel is forcing practically all of the large makers to retain their full output for their own mills. Makers of finished products who obtain their steel elsewhere, therefore, are having difficulty at present in locating tonnage. A fair tonnage of open-hearth rerolling billet has been offered and sold here on the government basis of $47.50, Pittsburgh, equivalent to $50.50, Philadelphia. Some slabs also have been sold here on the basis of $50, Pittsburgh. Numerous tonnages which are urgently wanted cannot be filled. The shortage is especially acute in forging billets. One leading eastern producer figures that he will not have any semifinished steel to spare before next July.

Big Tonnage is Wanted

Cleveland, Nov. 27.—Some inquiries for sheet bars remain in the market in this territory. One northern Ohio consumer is negotiating up to 25,000 tons for shipment through the first quarter. Some additional sales of sheet bars are being made at the government price of $51, Pittsburgh or Youngstown, but some of the large producers are short of steel and are refraining from marketing any tonnage. Some lots of wire rods for delivery through the first quarter have been made to consumers in this district, based on the fixed price of $57, Pittsburgh, for No. 5 rods.

Billet Tonnage Placed

Chicago, Nov. 27.—One of the heaviest tonnages awarded through government channels in this territory involves 70,000 tons of round corner billets about 6 inches in diameter for the manufacture of shells. Delivery of this tonnage is spread over several months.

Cold Rolled Tonnages Taken

Pittsburgh, Nov. 27.—Fairly numerous inquiries are coming to manufacturers of cold rolled strip steel. Most of the material is for government contracts. A noticeable number of consumers have been getting rid of purely domestic business and are turning to the production of government needs. Government specifications have not come before all consumers of cold rolled strip steel and this has had a tendency to withhold business from the mills. Deliveries depend on specifications. In certain sizes producers can , ship promptly. All sales are going at the established price of 6.50c, Pittsburgh.

Chain Co. Completes Organization

Organization of the Columbus-McKinnon Chain Co., Columbus, O., has been completed. The company is an amalgamation of the Columbus Chain Co., Columbus, O., and the McKinnon Chain Co., of Buffalo, N. Y., and St. Catherines, Ont., and has a paid-up capital stock of $2,500,000. Additions now are being made at the Columbus plant involving $50,000. The newly elected officers are: President, Charles W. Wambaugh, Columbus; vice presidents, George J. Armstrong, Buffalo, and Daniel Carroll, Columbus; treasurer, L. E. McKinnon, Buffalo; secretary and assistant treasurer, Arthur R. Markel. The officers with the following, go to make up the board of directors: S. A. Webb, I. B. Cameron, Cyrus Huling and Howard C. Park, Columbus.

To Aid Drooping Industry

Government and Steel Producers Show More Liberal Policy Toward Non-Essential Lines—No Revision of Bar Contracts

Cleveland, Nov. 27.—A change in the attitude of the government and steelmakers with regard to the requirements of the slumping passenger automobile industry has appeared. There is more disposition on the part of the federal authorities and the steelmakers to do all they can under the circumstances to supply material to this industry and to co-operate with it to keep it on an economical operating basis. Some of the pleasure car builders continue to ask the mills to suspend contracts or to extend expiring commitments through the first quarter. Nut, bolt and rivet manufacturers have been unable to induce the mills to rewrite steel bar contracts. A number of buyers are seeking first quarter bar contracts. Certain mills have been accepting definite lots for delivery as possible, at 2.90c, Pittsburgh. One sale called for 1500 tons. A quotation of 4.50c, Pittsburgh, is said to have been made by one mill. There is considerable demand for hot and cold rolled screw stock with various sales. A northern Ohio buyer wants 1200 tons of 13/16-inch to 1½-inch. One mill has been selling reinforcing bars at 2.90c, Pittsburgh base, but with extras this amounted to 3.30c, Pittsburgh. Other mills have met this price. Sales of bar iron at 3.50c, western mill, or about 3.70c, Cleveland, have been made.

Buying is More Orderly

Philadelphia, Nov. 26.—The rush in the demand for steel bars, has given place to more orderly buying. Now that the price has been fixed and distribution is to be made in accordance with the nation's needs, consumers no longer are dominated by fears of price advances, or that other buyers will get in ahead of them. Some first quarter contracts have been taken from regular customers during the past week at 2.90c, Pittsburgh, and a few small lots were sold to regular customers for early shipment at this figure. Several good-sized sales of concrete bars also were made on the 2.90c base. Demand for iron bars continues brisk.

Inquiries for Bars Limited

Pittsburgh, Nov. 27.—Inquiries for steel bars in this district are limited. Producers have sold small lots, but are not in a position to make offerings freely. Manufacturers of iron bars report a scarcity of muck bar, making it impossible to fill requirements for high-grade bars. Some of them also claim that they cannot sell and make a profit at the recently established price of 3.50c, Pittsburgh.

Situation is Quiet

Chicago, Nov. 27.—Comparatively little buying is being done in soft steel bars as the mills are not able to make contracts for future delivery in the face of heavy government requirements. The leading interest has accepted a few small contracts from regular customers but the time of delivery is uncertain under present conditions. Considerable inquiry is being made by consumers for 1918 requirements but the mills are making little response. Specifications on finished steel are holding up well. Hard steel bars are unusually quiet, with the market at 3.25c, Chicago mill. Demand is small. Regular customers are asking contracts for 1918, which are not forthcoming, as mills prefer to wait until a price is fixed by the government if such action is to be taken.

Shafting Tonnages Sold

Pittsburgh, Nov. 27.—Makers of cold rolled shafting are taking fair sized tonnages for domestic consumption at the recently established level of 17 per cent off to list, Pittsburgh. Government buying has been made in connection with requirements of the war department and the Emergency Fleet corporation. It is uncertain whether the mills will be able to take care of all requirements of domestic consumers.

Book Nuts, Bolts and Rivets

Pittsburgh, Nov. 27.—Fairly large new bookings for nuts, bolts and rivets have been taken during the past week by manufacturers in the greater Pittsburgh district who now are about 10 weeks behind on deliveries. Where requirements are pressing, shipments are being made in 30 days. Practically all of the business is directly or indirectly for the government, making it possible for manufacturers to obtain steel bars at 2.90c, Pittsburgh. They are, however, unable to obtain bars at this figure for orders from consumers not engaged on government work. Manufacturers of nuts, bolts and rivets have been unsuccessful in their effort to obtain revised contracts on steel bars although some makers are understood to have made a revision of old contracts to conform to the government schedules on these products. The greatest demand for rivets is for use in the merchant shipbuilding program.

Hoops Sold at 3.50c

Pittsburgh, Nov. 27.—Small tonnages of hoops have been sold by makers in the Pittsburgh district at 3.50c, Pittsburgh, which is taken to represent the level for material for hoop purposes, 13 gage and lighter, resulting from the schedules named by the American Iron and Steel institute committee. It is understood that no bands have been sold at 2.90c, Pittsburgh, which represents the steel bar price. Makers of hoops do not appear to be entirely clear as to their prices. It is the understanding that no official action has been taken on the base price and extras for hot rolled strip steel and hot rolled flat steel for cold rolling and in the absence of these it is not plain what figures should apply to hoop steel for other than hoop purposes, such as for stamping, automobile rims, etc.

Cotton Tie Season Closed

Pittsburgh, Nov. 27.—The cotton tie season being closed no inquiries are out and no additional tonnages are being taken by mills. Some producers who roll cotton ties steadily will begin producing in January for 1918 requirements. The price of cotton ties for November is $2.16 per bundle, Pittsburgh.

Quiet Market

Now Prevails in Ferroalloys—Spiegeleisen Demand is Liveliest

New York, Nov. 27.—Demand for ferroalloys has quieted down noticeably of late and current inquiries, as a rule are small. Most of the demand at present is for spiegeleisen, but the largest single inquiry which is out for this metal involves 500 tons. A Massillon, O., steelmaker purchased a considerable tonnage of both spiegeleisen and ferromanganese for the first half of 1918. Sales of spiegeleisen during the past week have been made at prices varying from $60 to $65, furnace, depending upon the size of the order and the time of delivery. This range indicates the market for the rest of this year and first half of next.

Sales of ferromanganese during the past week have been made at $225, $235 and $250, delivered, so that present quotations are included in a wide spread.

Ferromanganese Sold at $255, Delivered

Pittsburgh, Nov. 26.—A sale of about 300 tons of 80 per cent ferromanganese was made by an eastern furnace

to an Ohio consumer during the past week at a reported price of $255, delivered. Sales of this metal have been made at $250 and less, delivered. Inquiry for 20 per cent spiegeleisen is limited. This alloy is quoted at $60 to $65, furnace, although it is reported these figures might be shaded. Demand for the lower grades of bessemer ferrosilicon are in excess of the supply and furnace interests are taking care of their regular customers only, giving precedence to government needs. Prompt fifty per cent ferrosilicon commands from $150 to $160, and for first quarter is quoted at $130 to $150. The supply of this grade is reported to be scarce.

Part Revision

In Warehouse Prices Made by New England Jobbers

Boston, Nov. 26.—Conforming to government requirements, there has been since a week ago an all around reduction in warehouse prices. Local prices are not, however, down to the levels that the government has fixed, for local concerns do not feel they are required to take big losses, such as sales on the suggested basis would entail on the cost of the material now coming forward. Local dealers are holding for higher prices with an idea of keeping some supply on hand, for they feel that if some consumers load up, there is apt to be a scarcity along in February and March that would work a real hardship on those consumers who obey the government injunction.

Take Loss Philosophically

New York, Nov. 27.—To make their prices accord exactly with the warehouse differentials recently announced iron and steel jobbers here have indulged in considerable hair splitting. The present prices are as follows: Steel bars, 4.095c; shapes, 4.195c; plates, 4.445c; iron bars, 4.695c; blue annealed sheets, 5.445c for No. 10 gage; cold rolled one-pass black sheets, 6.445c for No. 28 gage galvanized sheets, 7.695c for No. 28 gage. Jobbers here are philosophical over the necessity of taking losses on a great amount of material which is coming in on higher-priced contracts.

Uncertain Points Cleared Up

Cleveland, Nov. 27.—Leading Cleveland warehouse interests have received a ruling which clears up some points pertaining to the recent fixed schedule. They now are quoting a price f. o. b. warehouse with all freight beyond that point to the account of the buyer. This is an equivalent of prices of 4.03½c, warehouse, for steel bars; 4.13½c for shapes; and 4.38½c for plates.

Ship Plate Orders Large

Chicago Mills Receive 50,000 Tons and Eastern Plants 35,000 to 40,000 Tons—Canada to Get Part of Tonnage

Philadelphia, Nov. 26.—Numerous large tonnages of plates were distributed by the Emergency Fleet corporation during the past week for shipment to companies having contracts to fabricate ship steel for the American International Shipbuilding Corp. All of the eastern mills received a share of this business, which involved a total of 35,000 to 40,000 tons. Some of this steel is to be shipped an eastern Pennsylvania fabricating plant, some to a Canadian fabricator, and a large portion is to go to western fabricators. At least one eastern Pennsylvania maker during the past week has accepted contracts for first quarter of 1918. This business was taken only from regular customers, however, and the proviso was made that government requirements are to come first. Demand has lost entirely the excited character of the first nine months of this year. Consumers have lost the fear of having somebody else get in ahead of them, and of seeing the price go up if they did not come in without delay. Consequently present demand is of a more orderly character.

Demand Continues Heavy

Pittsburgh, Nov. 27.—Platemakers continue to receive inquiries, and are not making any offerings. They are unable to take additional tonnages except in isolated cases. There has been no new car buying during the past two weeks and some car builders have diverted part of their capacity to the production of munitions, a tendency which is increasing among several classes of plants.

Prices Coming Down

Cleveland, Nov. 27.—Platemakers who have been selling above the fixed prices to the open trade gradually are dropping their prices. The top of the latter now is around 5c. mill. As the tonnage of direct and indirect government needs grows, the amount of material offered above 3.25c. Pittsburgh, is diminishing. The government apparently is pursuing a liberal attitude in allowing time to the mills buying their steel to work out high-priced semifinished contracts without loss. An eastern maker continues to offer universals at about the equivalent of government prices. A local mill has taken 500 tons for destroyers. Reports of an unusually large inquiry for 3/16-inch plates appear to be premature. None of the mills have received such an inquiry and it is uncertain whether the talk that such a one is coming out will be fulfilled.

Much Ship Material Booked

Chicago, Nov. 27.—Government orders are being placed with local mills in considerable tonnage, approximately 50,000 tons having been awarded within the past few days. This total includes 35,000 tons with the leading interest, 8000 tons for the Submarine Boat corporation, 5100 tons for four boats to be built by the American Shipbuilding Co. at Chicago and 1000 tons to be delivered to fabricators working on material for the Emergency Fleet corporation. The last three items will be furnished by the leading independent.

Wire Demand

Shows Good Expansion Since Fixing of Prices—Some Contracts Booked

Pittsburgh, Nov. 27.—Demand for wire and wire products is active, a portion of it being for export. Mills are unable to meet all requirements and some of them are cautious about committing themselves for first quarter. This policy has been adopted partly because of the needs for steel in other lines. Fair-sized contracts are being taken by producers who are attempting to take care of their regular customers as nearly as possible. Consumers who were withholding purchases have come into the market since prices were fixed.

Sales are Larger

Cleveland, Nov. 27.—Further sales of wire mill material for manufacturing purposes are being made in this territory by leading makers. Quantities are being made specific for shipment by April and no contracts are being accepted. Several of the bolt makers have been buyers. Owing to the shortage of basic steel, some bolt manufacturers have been trying out bessemer quality and this transposition promises to grow.

Receive Shell Orders

The Ingersoll-Rand Co., Philipsburg, N. J., has been awarded a contract by the ordnance bureau of the navy department to furnish 336,000 5-inch projectiles. The Baldwin Locomotive Works has an order for 30,000 6-inch shell forgings.

Need Heavy Ship Tonnage

Submarine Boat Corp. to Require 300,000 Ton of Structural for New Government Contracts—War Business Dominates Market

New York, Nov. 27.—Additional contracts for 100 vessels of 7500 tons each have been placed by the Eergency Fleet corporation with the Submarine Boat Corp. This new contract will call for 300,000 tons or more of steel. Orders for the fabrication of this tonnage are expected to be arranged for in the near future. Structural demand for eastern territory remains light apart from government undertakings.

Government Demands Increase

Pittsburgh, Nov. 27.—Increased demands are being made by the government for structural material in connection with its shipbuilding program. Fabricators are booked heavily with these requirements and are unable to take tonnages for private account, with any prospect of making early delivery. Indications are that domestic consumers who are now figuring in the market in a relatively small measure only will receive still less consideration until the needs of the government are filled. Fabricators of the country, including the Bridge Builders' and Structural society, met today in this city and mapped out plans of concentrating their efforts to serve the government.

Crane Steel Unplaced

Cleveland, Nov. 27.—No award has been announced of the three 350-ton fitting out cranes for the navy department, requiring 6000 tons of structural steel, upon which the McMyler Interstate Co and the Wellman-Seaver-Morgan Co. have submitted bids. Other lots of crane steel remain in the market. Various fabricating shops in this district continue to figure on work for the Emergency Fleet corporation and one northern Ohio plant has received 1000 tons. The fulfillment of an order for turntables for the Russian government requiring 700 tons, which recently was awarded to an Ohio company, has been rendered uncertain by political developments in that country.

Tonnage is Divided

Philadelphia, Nov. 26.—A large part of the fabricated steel for the first 25 vessels to be built for the government by the American International Shipbuilding Corp. will be furnished by the McClintic-Marshall Co., and most of the other tonnage is to be furnished by western fabricators, although as previously reported one contract was let to a Canadian bridge shop. Nothing yet has been done in connection with the steel for the second lot of 25 vessels to be built by the American International company, but it is expected that bids shortly will be requested. Demand for structural material now is restricted to a few projects for government buildings. Outside of the government, there are no live lettings in sight. Plain shapes are easy to get from at least one eastern mill. This interest is quoting 3c, Pittsburgh, for standard shapes, subject to mill convenience. A differential of 10 cents per 100 pounds is asked on special sections, and of 50 cents per 100 pounds on shapes from stock.

CONTRACTS AWARDED

Machine and forge shop, Milwaukee Forge & Machine Co., Milwaukee, 175 tons, to Northwestern Bridge & Iron Co., Milwaukee.

Machine shop addition, Harley - Davidson Motor Co., Milwaukee, 135 tons, to Northwestern Bridge & Iron Co., Milwaukee.

Buildings at Langley field, Va., 250 tons to Pittsburgh-Des Moines Steel Co.

Eight buildings for American International Shipbuilding Co., Hog Island, Philadelphia, 950 tons to Belmont Iron Works.

Bridges for New York Central railroad, 450 tons, to an independent fabricator.

CONTRACTS PENDING

Brass foundry at Washington navy yard, 650 tons. Warren Moore & Co. low on general contract.

General foundry building at Washington navy yard, 550 tons, Warren Moore & Co., low on general contract.

Machine shop extension at Washington navy yard, 400 tons, bids being taken.

Rails Reserved

By New York Central for 1919—Italy Wants Many Cars

New York, Nov. 27.—While no formal contracts have been placed, the New York Central lines have made reservations for several miles, for a total of 150,000 tons of rails for 1919 delivery.

Light Rails Wanted

Pittsburgh, Nov. 27.—Inquiries involving relatively small tonnages are coming to manufacturers of light rails. They have increased somewhat since the general committee of the American Iron and Steel institute established a price of 3c a pound, Pittsburgh, on these sections. So far as known no lots have been sold at the new price. Before this level was named by the committee, light rails, 25 to 45 pounds, were being sold in the Pittsburgh district at from $75 to $85 a ton, Pittsburgh. There is practically no inquiry for standard steel rails. No price has been named on standard rails or standard spikes. Small lots of the latter are being sold at from 4c to 4.50c, Pittsburgh, although it is reported that in some instances business has been taken at levels in excess of those named. Some producers continue to quote spikes at as high as 6.50c, mill, but the market appears to be quotable at from 5c to 5.50c.

Car Market Quiet

Chicago, Nov. 27.—The Union Pacific railroad has placed 1000 hoppers with the Pullman Co. on its inquiry for 4500 of this type. The remainder is unplaced. The Illinois Central has recalled its inquiry for 1000 70-ton hopper cars, and has issued a new inquiry for 1000 50-ton hoppers. The Italian government is taking bids through the United States government for 6000 to 9000 four-wheel cars.

Announcement of a base price on light steel rails of $3 per hundred pounds changes the method of quoting on this product, which formerly had been on a gross ton basis. The new price makes the quotation on 25 to 45 pound rails, which is the base size, $67.20 per gross ton. This compares favorably with the quotation of $70 per ton on this size before the price was fixed. The differential for lighter weights of rail is 4½ cents per 100 pounds, which compares with the former custom of $1 per ton and does not change matters materially.

Cast Pipe Prices

About to be Fixed—Government Quotations are Reduced

New York, Nov. 27.—Prices which are to be fixed on cast iron pipe now are being decided upon by a committee of the cast-iron pipemakers and it is expected that these will be recommended to the American Iron and Steel institute this week for announcement. In the meantime, the market in the east may be quoted lower at $54.50, New York, for 6-inch class B, and $57.50 for 4-inch, class B. Demand is unusually dull. Most of the business placed of late has been of small lots for government purposes. Some time ago, a special price of $59, at northern and $55 at southern foundries was quoted on government business by agreement among the makers. About a week ago, however, this special price was reduced to $49 at northern and $45 at southern foundries.

The only public letting in sight is a tonnage for Canada.

Iron Pipe is Active

Pittsburgh, Nov. 27.—Strong demand exists for lap weld iron pipe and comes principally from the railroads and oil producers. Mills are able to take tonnages for this class of material, but are from two to three months behind on deliveries. Butt weld iron pipe is not in strong demand, owing to the decline in commercial building construction. Deliveries can be made promptly by producers. The demand for standard steel pipe is heavy, but the mills are far behind in deliveries and some of the more prominent makers are unable to accept new business.

Cast Pipe Still Dull

Chicago, Nov. 27.—Comparatively little business is coming to the front in cast iron pipe and many projects on which bids are made failed to result in sales. Figures were taken at Wooster, O., last week on iron, steel and concrete pipe but all figures were rejected as exceeding the appropriation. Bids will be opened Jan. 3 at Winnipeg on about 4500 tons of large size pipe. This business was up several months ago, but prices then were too high and bids were rejected. Figures were to be opened at Jackson, Mich., Nov. 26 on 167 tons.

New Business Needed

Birmingham, Nov. 27.—While cast iron pipe trade is not as active as it has been, there is but little, if any curtailment of the melt of iron at the pipe foundries in this territory. However, there is need for new business. The soil pipe makers expect improvement in trade conditions and two or three plants now partially or wholly out of commission are expected to resume operations after the first of the year.

Plate Tonnage

For Allied Needs is Placed With Youngstown District Mills

Youngstown, Nov. 28.—Between 40,000 and 50,000 tons of universal plates have been allotted among the mills in this and nearby districts. While this tonnage was distributed by the government, it is understood it will be forwarded to the allies. Inquiry for universal plates is extremely heavy although little or no tonnage is available for this quarter since the government has become such a strong factor in the market. However, light tonnages of grooved and sheared plates are being shipped from time to time.

Destroyer Sheets Placed

Large Additional Tonnage Distributed to Various Mills—Further 1918 Contracting Being Done With Regular Customers

Youngstown, O., Nov. 28.—Huge tonnages for sheets are being placed by the government among Mahoning valley mills. The tonnages comprise mostly blue annealed and black material and will be used largely for torpedo boat destroyers and submarines. One sheetmaker accepted over 1000 tons. The government orders call for various sizes and gages manufactured from open-hearth stock. Though the shapes specified are irregular, deliveries will be made immediately to eastern fabricators who in turn will forward the finished material to "some port", where it will be assembled. Inquiry throughout the valley for all grades of sheets remains active although little material is to be had. One maker states that his company has been out of the market for about 10 days and will continue to stay out until the government orders are nearly completed. This is representative of nearly all sheet mills in the valley as far as new business is concerned. Regular customers, however, are being taken care of and in a few cases have been able to cover their requirements for first quarter. So far the coal shortage has not handicapped the sheet mills in this district to any great extent although the outlook at present is none too promising. Few mills have been able to keep more than 24 hours' supply of coal in stock. Manufacturers of sheet bars state if shipments of coal go lower delivery of the product to finishing mills will be threatened.

Eastern Mill Opens Books

Philadelphia, Nov. 26.—The leading eastern producer has opened his books for blue annealed sheets for the first quarter of next year. Only the requirements of regular customers are being taken, however, and these subject to the understanding that all government orders will be filled first. In some cases regular customers have been taken on for the entire first half. All this business was booked at the government base of 4.25c, Pittsburgh, for No. 10 gage blue annealed, or 4.435c, Philadelphia.

Take Tonnages for 1918

Pittsburgh, Nov. 27.—Makers of sheets continue to take tonnages for 1918 delivery. Galvanized tonnages are being sold for first quarter and black sheets for the first half. Inquiries are heavy and manufacturers are exerting every effort to take care of their regular customers as completely as possible. It is probable, however, that the full requirements of the latter can not be met and owing to this fact tonnages are being allotted. The leading producer continues to follow a plan of supplying tonnages according to demands of the various sales districts. Large requirements by the government have made it necessary for producers to supply only consumers who are engaged in the manufacture of essentials. Manufacturers are unable to form a comprehensive idea as to what their 1918 output may be, due partly to the uncertainty as to supplies of steel.

Government Buys Tonnage

Chicago, Nov. 27.—Demand for steel sheets has been excellent since prices were definitely fixed and mills are booking considerable business. An important item recently awarded the leading independent producer in this territory involves 4000 tons of blue annealed sheets for government use.

Russian Plants in Danger

Chicago, Nov. 27.—Announcement, from Petrograd that the present government has announced a confiscation of all corporate property of nobles, merchants and burgesses is causing some concern to corporations in Chicago holding large property interests in Russia. The International Harvester Co., the Crane Co., and the Standard Oil Co. are among those which have large plants in Russia valued at several million dollars and some apprehension is felt over the fate of their investments there. Heads of these companies refuse to express any opinion on the situation other than that they hope for the best.

Occupies New Plant

The Chicago Flexible Shaft Co. is moving into its new plant at Fifty-sixth avenue and West Twelfth street, Chicago. The new structure is one story, saw tooth roof, 300 x 550 feet. A feature is the large heat treating department for hardening steel used in its shear shop. This company also builds heat treating furnaces of the type developed by its own practise.

Fullest Aid

To Government Pledged by Fabricators in Effecting New Organization

Pittsburgh, Nov. 27.—Representing 76 companies throughout the country, fabricators held a meeting today at the William Penn hotel upon the call of a war service committee made up of members of the industry and formed an organization for the duration of the war known as the Steel Fabricators of the United States. The organization is designed to aid the government and to this end proposes collective rather than individual dealings with the latter in connection with its requirements upon the fabricating industry. The permanent organization comprises the president, C. D. Michael, president of the Virginia Bridge & Iron Co., Roanoke, Va., and the secretary-treasurer, L. D. Rights, of Louis F. Shoemaker & Co., New York, together with the original war service committee, whose membership is to be increased by the selection of four additional members to be appointed by Mr. Michael.

The convention organized by making permanent the temporary organization officers, President Michael and Secretary-Treasurer Rights, and the war service committee, with provision for increasing the membership of the latter. The committee was authorized to establish and maintain representation at Washington which, if desired by authorities, will co-operate with the Emergency Fleet corporation and other government agencies. It will be the purpose of the committee to give expert advice to the government in the matter of distributing tonnage and to take the best possible care of its fabricating requirements in other directions.

By a resolution unanimously adopted the fabricators pledged the services of the industry to the government. By-laws for the new organization will be prepared by the president, secretary-treasurer and the war service committee. The latter which will act as an executive committee, consists of John Sterling Deans, Phoenix Bridge Co., Phoenixville, Pa.; George P. Bard, Petroleum Iron Works Co., Sharon, Pa.; Thomas Earle, Bethlehem Steel Bridge Corp., South Bethlehem, Pa.; H. A. Fitch, Kansas City Structural Steel Co., Kansas City, Mo.; J. L. Kimbrough, Indiana Bridge Co., Muncie, Ind.; C. D. Marshall, Marshall-McClintic Co., Pittsburgh; L. D. Rights, Louis F. Shoemaker & Co., New York, and H. A. Wagner, Wisconsin Bridge Co., Milwaukee.

The Shepard Electric Crane & Hoist Co., Montour Falls, N. Y., has recently received orders for the following cranes from the Baldwin Locomotive Works, Eddystone, Pa.; Eight 20-ton 5-motor electric traveling cranes, 76-foot span; five 10-ton, 4-motor, 47-foot span; two 15-ton with 5-ton auxiliaries, 76-foot span. All of these are of the overhead electric traveling type.

Engineers in War

Will Be General Theme of Annual Convention of A. S. M. E.

What is expected to be the greatest convention in the history of the American Society of Mechanical Engineers, will be held in the Engineering Societies building, New York city, Dec. 4, 5, 6 and 7. The dominant theme of the meeting will be the engineers' part in the war, and an interesting program has been arranged touching on virtually every phase of the question. Tuesday evening an honorary membership will be conferred on Maj.-Gen. George W. Goethals, with an address by Hon. William H. Taft. The introduction of the president-elect and the President's reception also will come on that evening.

Following a business meeting Wednesday morning, the "keynote" session of the convention will be held.

Simultaneous with the continuation of the "keynote" session in the afternoon, will be three meetings devoted respectively to power plant subjects; to general papers technical in character; and to codes prepared by the subcommittee on protection of industrial workers, on safety standards for elevators and woodworking machinery. A smoker will conclude the day.

There will be a session Thursday morning under the auspices of the sections committee given over to a discussion by delegates, thereby affording an opportunity for a comparison of methods employed in the various sections. Thursday afternoon, a session will be devoted to the subject of "Inspection in Munitions Manufacture," under the auspices of the subcommittee on machine shop practice. Friday morning, the closing session of the period will be given over in part to the discussion of two problems: namely, the increasing employment of women in the machine shops and munitions works; and the preparatory work now being undertaken for training the large number of crippled men, who may be expected to return from the war.

The Inland Steel Co. has a service flag in its Chicago office containing 168 stars. About 20 more will be added shortly for men taken by the draft recently.

Further Extras

On Tin Plate Covering Width and Length are Announced

E. H. Gary, chairman of the committee on steel and steel products of the American Iron and Steel institute, referring to the recommendation of the committee, under date of Nov. 20, covering certain differentials and extras on sheets, tin plates and round billets for seamless tubes, states that the committee now recommends a further list of extras on tin plates covering width and length on cokes and charcoals. This list, which covers all grades of cokes to premium charcoals, is as follows:

No. 16 Gage to No. 24 Gage Inclusive

1c per 100 lbs. for each inch or fraction over	30 inches wide
1c per 100 lbs. for each inch or fraction over	30 inches long

195 Pounds to 90 Pounds Inclusive

5c basis for each inch or fraction over	28 inches wide
2c basis for each inch or fraction over	30 inches long

Lighter Than 90 Pounds to 75 Pounds

10c basis for each inch or fraction over	28 inches wide
4c basis for each inch or fraction over	30 inches long

Lighter Than 75 Pounds to 55 Pounds

15c basis for each inch or fraction over	28 inches wide
5c basis for each inch or fraction over	30 inches long

Advertising Chief Resigns

L. F. Hamilton has resigned as manager of the advertising department of the National Tube Co., Pittsburgh, and has accepted a position as manager of sales promotion of the Walworth Mfg. Co., Boston, manufacturer of pipe fitting machinery, which bought the Kewanee, Ill., works of the National Tube Co. Mr. Hamilton will be succeeded by W. L. Schaeffer, who has been his assistant for seven years. The change becomes effective Dec. 1.

Government Buys Land

An agreement has been reached whereby the United States government will pay $1,330,000 for land at Port Newark Terminal, N. J., for a site for quartermaster's supply depots. With this money the city of Newark plans to develop 400 additional acres at the terminal. Government buildings, for which plans already have been drawn, will occupy 133 acres and the government has asked an option on an additional 190 acres. Buildings to be erected for the storage of military supplies to be sent abroad will cost $7,500,000.

More Statistics

On War Orders Called for, Though Data Already are on Hand

Washington, Nov. 27. — Leading manufacturers engaged in producing war materials were suprised last week to receive from the statistical division of the war industries board a questionnaire seeking information regarding war orders, which is already in the records of the war board. To comply with the request of the division would mean establishment of a new department in mills already confused by the shortage of clerical help because of inroads of the draft and by the uncertainty of conditions generally resulting from the war.

The questionnaire was sent out by Dr. Leonard P. Ayres, chief of the division, apparently in the names of the war industries board and the priorities committee. Many manufacturers who received the communication are inclined to disregard it and others have complained to the board of the work entailed in the request. The division has made some effort at secrecy in the matter and has given no explanation, even upon special inquiry, of why it wants the trades to duplicate, in another form, the information on file here in Washington.

The questionnaire is as follows:

The war industries board and the priority committee desire to secure complete records of the war contracts now outstanding with the more important industrial establishments. These records are needed as a basis for establishing priority classifications so as best to meet military necessities.

We shall greatly appreciate your courtesy if you will furnish us as promptly as possible duplicate lists of your present war orders, classified under four main headings as follows:

First: War orders placed directly with you by one of the departments of the United States government.

Second: War orders placed with you by the allied governments.

Third: Indirect war orders for the United States government, but placed with you by some other establishment holding the direct order.

Fourth: Indirect orders for one of the allied governments, but placed with you by another establishment holding the direct order.

The data for each order should include the following:

1. Department placing the order, for example, Quartermaster Department, U. S. A.
2. Government order number.
3. Date of contract or order.
4. Article.
5. Quantity of article.
6. Delivery terms (in brief).
7. Unit price.
8. Priority certificate on this order, if any.

In the case of orders for the allies, the identity of the government placing the order should appear as item No. 1 in place of the name of the army or navy department. In the case of indirect orders, either for our government or for allied governments, the returns should show both the department or foreign government for which the articles are being furnished, and the name of the establishment holding the original order placing the suborder with you.

It is becoming evident that these records will be necessary as a part of the military data essential to the successful prosecution of the war, and the present plan is to secure monthly in the future a record of additions and changes among the war orders on your books. It is planned to send in the future record forms on which the information can be conveniently entered in your offices and forwarded to this office. The returns now requested, however, should be made as promptly as possible and without waiting for the record forms.

Official Changes Are Made in Allied Machinery

Samuel McRoberts, who with others in 1911 organized the Allied Machinery Co. of America, to introduce American machine tools into Europe, and who has acted as chairman of the company since it was acquired by the American International Corp., has resigned to take a position with the government, which position necessitated the giving up of his active business interests. R. P. Tinsley, vice president of the American International Corp., succeeds Mr. McRoberts as chairman of the Allied Machinery company. R. B. Sheridan has retired from the presidency of the Allied Machinery company to become a vice president of the American International Corp. and to devote his time to rehabilitation work which he made a study of while in France. He will, however, continue as a member of the executive committee of the Allied Machinery company. Mr. Sheridan is succeeded by J. W. Hook, formerly active vice president. Mr. Hook, who joined the Allied Machinery company in August, 1916, has had many years of experience in the machine tool field. The company's European business will be in charge of C. E. Carpenter, president of the Allied Machinery Co. of France, as heretofore.

Canada Embargoes Iron

New York, Nov. 27.—Canada has placed an embargo on shipments of pig iron to all countries other than British possessions. It is believed that on all further shipments from Canada to the United States special permits will have to be secured in the same way that permits now are necessary for shipping pig iron from the United States into Canada.

New Manager

Of Fleet Corporation Will Fit In With Plan of Co-Operation

Washington, Nov. 27.—Rear Admiral Frederick R. Harris, who was chief of the bureau of yards and docks in the navy department and now has succeeded Rear Admiral Washington L. Capps as general manager of the Emergency Fleet corporation, is the third general manager of the corporation. The first, Maj. Gen. George W. Goethals, was replaced by Admiral Capps as a result of the famous Goethals-Denman row. It had been reported that there had been friction between Admiral Capps and Chairman Hurley of the shipping board, but both gentlemen deny this. It is a well known fact Admiral Capps has been ill.

Admiral Harris will not have as broad powers as General Goethals had or as broad as those exercised by Admiral Capps until recently. Charles Piez, president of the Link-Belt Co., Chicago, who has been made vice president of the Fleet corporation, has virtually taken up these duties and Admiral Harris will co-operate with him.

In the last few months the shipping board and the Emergency Fleet corporation have been expanded greatly. The corporation, re-organized after the Goethals-Denan fiasco, now is constituted as follows: E. N. Hurley, chairman; Raymond B. Stevens, vice chairman; John A. Donald, Bainbridge Colby and Charles R. Page, commissioners; Admiral Harris, and Capt. E. T. Bertholf, all of whom constitute the board of directors. Messrs. Hurley, Stevens, Donald, Colby and Page are the commissioners of the shipping board. Its secretary is Lester Sisler. Edward F. Carry is director of operations and Edward B. Burling is chief counsel.

The officers of the Fleet corporation are: Edward N. Hurley, president; John A. Donald, vice president; Charles Piez, vice president; Raymond B. Stevens, treasurer; Lester Sisler, secretary; Rear Admiral Harris, general manager; George E. Oller, executive secretary; Laurence Leonard, chief clerk; Rear Admiral F. T. Bowles, manager of construction division; Daniel H. Cox, assistant to manager of construction division; Theodore E. Ferris, naval architect and construction engineer; Horace H. Thayer Jr., assistant to the naval architect; Meyer Bloomfield, head of industrial service department; E. C. MacNary, expert in industrial training; Rear Admiral Adam H. H. Rousseau, manager shipyard plants division; Reuben E. Bakenhus, assistant to manager shipyard plant division; C. T. Bissell, advisory engineer of fire protection; George S. Radford, manager contract division; Frank A. Browne, general purchasing officer, and others.

Sell Plates

Some Producers Offer Odd Lots—Furnaces Take Foundry Coke

Pittsburgh, Nov. 28. (By wire.)—Offerings of odd lots of plates are being made by producers in the greater Pittsburgh district. While some of these tonnages technically might be considered as stock supplies, it is understood that makers are asking mill price rather than the higher warehouse level. Fair-sized tonnages of plates have been bought by consumers in the Pittsburgh district from eastern makers.

Inability of pig-iron makers to obtain furnace coke has caused a number of them to buy 72-hour fuel at $7, ovens, or $1 above the furnace coke price. The furnaces are able to obtain tonnages of foundry coke, which otherwise they could not get, owing to the order of the fuel administration that coke be shipped to blast furnaces only. This has caused an increased shortage of fuel at foundries, an additional number of which have been compelled to close down.

Shipping Board Controls Many Million Tons

Washington, Nov. 27.—Official announcement of the shipping board discloses that the Emergency Fleet corporation has under contract, under requisition or completed and released a total of 1409 vessels of all types of an aggregate of 8,363,808 deadweight tons. Of the total, 884 are under contract, of which 451 are to be of steel, 375 of wood and 58 of composite steel and wood construction. Contracts are pending for 99 other ships. Those requisitioned total 426.

The vessels contracted for have a total capacity of 4,724,300 tons, 3,186,400 being in steel. The vessels for which contracts are pending have a total tonnage of 610,000 and those requisitioned of 3,029,508 tons. Of the requisitioned ships 33 have been completed and represent 257,575 tons carrying capacity.

Strip Mill to Start

Within a few weeks the new hot strip mill of the Trumbull Steel Co., Warren, O., will be placed in operation. This mill is expected to show a high efficiency and low conversion cost since the finished material will be produced from the billet without reheating. A 36-inch two-high blooming mill is being installed by the United Engineering & Foundry Co., and will serve the 18 and 21-inch bar mills to be built later. One of the six 100-ton open-hearth furnaces is completed and the company expects to have the remaining units completed by January.

To Assist Replogle

Paul Mackall assistant salesmanager for the Bethlehem Steel Co has been appointed assistant to Steel Director J. L. Replogle and will be in charge of the buying and distributing of projectile steel with headquarters at Washington.

Opens Capital Office

The Inland Steel Co. has opened an office at 503 Wilkins building, Washington, in charge of O. P. Black, who formerly was sales manager at the St. Louis office of this company. This office is for the purpose of giving closer co-operation with the government.

Takes Order for 40 Ships

The American Shipbuilding Co., Cleveland, has received an order from the Emergency Fleet corporation for 40 ocean-going vessels of about 3500 tons carrying capacity. These vessels will require about 40,000 tons of steel. They are of standard Welland canal size, similar to those which are now being built on the lakes in large number. With the orders previously held, the American company now has contracts for delivering about 70 salt water boats during 1918.

Take Ship Contracts

Contracts for 10 steel merchant ships of the 9500-ton type have been awarded to the Erickson Engineering Co., Seattle, Wash., by the Emergency Fleet corporation. The Patterson-McDonald Shipbuilding Co., Seattle, has been awarded a contract for 8800-ton merchant vessels valued at $24,000,000.

The Non-Ferrous Metals

Copper Lead Spelter Tin

New York, Nov. 27.—Following further meetings of Eugene V. Meyer Jr., of the war industries board with the copper producers' committee at 60 Broadway, this city, arrangements have been completed whereby the requirements of the copper jobbing trade may be filled. The committee has sent letters to a selected list of jobbers stating that such arrangements had been made, subject to certain restrictions and that a small quantity of copper will be released at once to these jobbers, who must, in turn, make a report at the end of each month of sales and deliveries. The jobbers selected, were asked to sign and return a letter sent them, in which they promise to resell the copper in less than carload lots only, charging a commission of not over 5 per cent to cover expenses and profits of handling this business, although freight may be added to point of destination. Thus the wrinkles in the copper situation gradually are being ironed out and as supplies of copper become available over and above the war requirements, the needs of the consuming trade not working on war orders will be taken care of.

The zinc committee recently sent a letter to the war industries board, containing recommendations formulated in connection with the government's price fixing program. The committee made no suggestions as to a price for prime western, which is the basis of the spelter market, but did make suggestions as to fixed differentials between the various grades. These differentials consisted of ¼c to ½c for brass special over the price of prime western; 2c for grade B and 3c to 3½c for Grade A over the prime western price. The spelter market has shown little activity in the past week, but no further weakness has developed. Prime western is quoted as follows: Prompt, November and December, 7.75c to 7.87½c, St. Louis; first quarter, 8c to 8.25c. Brass special is quoted 8.25c, St. Louis, for delivery this year.

The government has commandeered more stocks of Straits and other 99.75 per cent grades of tin from warehouses in this district, most of which stocks were owned by consumers. It is estimated that between 200 and 300 tons were requisitioned this week, which emphasizes the strained position in the spot market. A few scattered sales of small lots of Straits have been made at around 79.50c and 80c, New York. The American Iron and Steel institute subcommittee on tin has been given power to control tin distribution in this country and has taken steps to exercise complete supervision of all tin arriving in this country. As a result of this step it is expected that the London rubber and tin exports committee may relax its firm grip on supplies and relieve the spot situation in this country. Some Banca tin was reported sold recently at 85c, a record price in this country. Billiton has been offered in small lots of 79c. Chinese No. 1 and other 99 per cent grades are quoted about 66.50c, New York.

The lead market has been quiet and little changed the past week. The leading interest continues to quote 6.25c, New York, 6.17½c St. Louis. Independent sellers as a rule are out of the market, while dealers and brokers call the market 6.25c to 6.37½c, St. Louis, for prompt November or December shipment. A price of 6.50c, New York, is quoted by outside sellers for first quarter shipment.

Following a purchase of spot antimony by the Bethlehem Steel Co. recently at 13.75c, duty paid, the antimony market has shown more signs of life and up to 14c has been bid. Holders are asking 14.25c.

The outside aluminum market is unchanged; No. 1 virgin is quoted 36c to 37c; No. 1 remelted, 35c to 36c; No. 12 remelted, 27c to 28c.

Economical Use of Grinding Wheels

A Thorough Understanding of the Grinding Wheel as a Cutting Tool is an Essential Factor in the Solution of the Problem of Economically Grinding Castings

BY W. T. MONTAGUE

THE modern grinding wheel plays an extremely important part in the metal-working industries. Its great usefulness begins in the foundry just as soon as the newly poured castings have become sufficiently cool to be removed to the cleaning floor. It is used in the alloy steel industry to remove seams, blisters and flaws from billets, prior to rolling them into commercial shapes. Large numbers are used later on to grind the various metal parts that are fashioned into machine tools, automobiles, airplanes, locomotives, war munitions and the multitude of steel tools that are also employed in cutting metals.

Realizing that the grinding wheel is practically indispensable to the foundryman, it is fair to assume that he is vitally interested in those factors that contribute to the economical use of this cutting tool. Although widespread publicity has been resorted to by some of the grinding wheel manufacturers, in order to demonstrate the methods of using and caring for grinding wheels to obtain maximum service at minimum cost, yet there are evidences that there is much to be learned in this direction.

To develop the modern grinding wheel into a tool of usefulness and dependability, has been the abrasive manufacturer's problem, but the problem is not solved when the wheel is produced. The grinding wheel maker must go further than this. He must educate the user so that he can take advantage of all the qualities that science and skill have put into the wheel.

Analysis of Grinding Wheel Problem

The development of this subject will rest upon the following analysis of factors that will contribute to the economical use of grinding wheels in the foundry, if they are understood and taken into consideration:

A thorough understanding of the grinding wheel as a cutting tool is the first essential.

The castings to be ground must be carefully considered with special reference to their size and shape, the physical properties of the metal, and the amount of grinding to be done.

The condition of the grinding machines must be satisfactory. This refers to weight and rigidity, solid foundations, adequate bearings and proper lubrication.

The speed of the grinding wheel is of the utmost importance and must be held within certain limits if proper cutting action and economy in wheel consumption are to be obtained.

The personal factor must be taken into consideration and allowances made for it.

Adequate records of wheel consumption should be kept and if conditions warrant industry and economy on the part of the workmen should be properly rewarded.

The use of the grinding wheel should be made safe by proper protection devices.

Cutting Grinding Costs

Efficient and economical grinding is accomplished through a balance between maximum cutting and minimum wheel consumption. The life of an abrasive wheel is seriously affected by improper foundations and by operation at speeds either above or below normal. Adequate records of wheel consumption as a basis of rewarding workmen for industry and economy are recommended. In selecting wheels, the physical properties of the metal and the amount of grinding to be done are factors of prime importance.

It is a well-known fact that the amount of work one gets out of a machine, engine or tool, is often directly proportional to one's knowledge and understanding of that machine, engine or tool, granting, of course, that the tool is not defective or unsuited to the operation in the first place. This is particularly true of the grinding wheel, which is an aggregation of minute cutting tools bonded together so they can withstand the high rotative speed necessary to rapidly remove large quantities of metal.

The composition of the vitrified grinding wheel, which type is almost always used for snagging castings, is as simple as its manufacture is complex. It is made of abrasive grain, clay bond and water. Subsequent burning in a kiln and heat treatment vitrifies the bond and produces that quality termed "hardness".

The Choice of Wheels

The selection of abrasive material is almost entirely dependent upon the nature of the metal to be ground. There have been developed for cutting the metals used in castings today, two principal kinds of artificial abrasive—the aluminous group and the carbide of silicon group. Included in the former are alundum, aloxite, borocarbone, adamite, and the like, and in the latter group crystolon, carborundum, carbolite, etc. Without going into the reasons therefor, we will simply state that experience has shown that for materials of high tensile strength, the aluminous abrasives prove the most efficient. This means that the various kinds of steel, wrought iron and annealed malleable iron, automatically call for an abrasive such as alundum. On the other hand, crystolon is chosen for cast iron, including gray and chilled iron, unannealed malleable iron, brass, bronze, aluminum and copper, which are materials of comparatively low tensile strength. This distinction is clear cut and quite easy to remember.

The question of what size of grain to use is not difficult to settle. The size of the wheel, amount of material to be removed, and the nature of the metal usually determine this very readily. Finish is seldom a consideration and so very coarse grits are used.

How hard to bond a grinding wheel is a point not so readily determined. The influencing factors are many, including:

Physical properties of the metal to be ground.

Shape and condition of the surface to be presented to the face of the grinding wheel.

Speed of the grinding wheel.

Condition of the grinding machine as to rigidity and steadiness of spindle.

Method of applying the work, that

The author of this paper, which was presented at the Boston meeting of the American Foundrymen's association, is associated with the Norton Co., Worcester, Mass.

is, whether mechanically or entirely by hand.

Manufacturers of abrasive wheels in trying to serve customers and meet their requirements, are continually reminded that the question of what constitutes a "grade" or the degree of hardness of a grinding wheel is not fully understood. Grade is the word used to designate relative hardness of any given grinding wheel. By hardness, we do not in this instance refer to the hardness of the abrasive, which is fixed throughout any one wheel. We refer to the strength of the bond in retaining its grip on the cutting grains of the wheel. If the bond is of insufficient strength to hold the cutting particles in the face of the wheel until they have become dulled and worn from the cutting process, then we call the wheel too soft. On the contrary, an excessively "hard" wheel is one where the bond retains the grit long after it has become dulled and is therefore practically useless. The word "hardness" might almost be called a misnomer and perhaps the somewhat more clumsy phrase, "resistance to disintegration", ought to be substituted.

This resistance to disintegration, or grade, is actually determined by measuring another separate property of the wheel, namely, the resistance of the bond to the penetration of a hardened steel tool. However, it is known that each of these properties is a function of the other and to measure the force of resistance to disintegration in grinding wheels has been impossible on a commercial scale up to this time.

The belief is quite common that a grade is an exact value. A grade is not an exact value or a definite point in the scale of hardness. It is a range between limits and all wheels which test within this range carry the same grade letter.

One way to measure the strength of the bond is to revolve a grinding wheel at increasing speeds until it bursts. Knowing the bursting speed, the centrifugal force necessary to cause the bond to break down can be readily calculated.

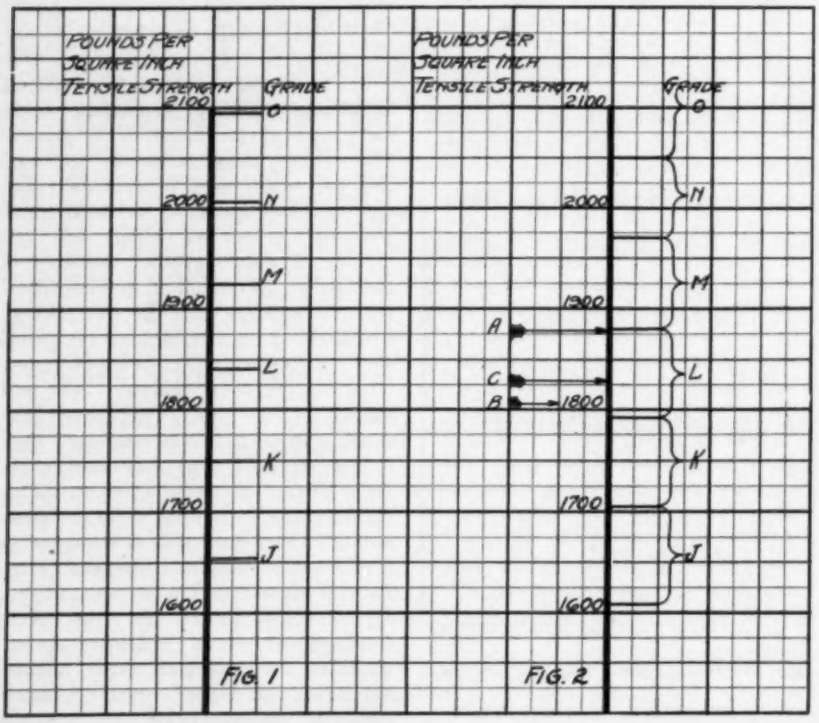


FIG. 1—BREAKING STRENGTH OF WHEELS OF VARIOUS GRADES. FIG. 2—RANGE IN BREAKING STRENGTH OF WHEELS OF VARIOUS GRADES

In order to obtain the data used in plotting Fig. 1, a lot of wheels were speeded up to point where the fiber stress, due to centrifugal force, exceeded the strength of the bond and breakage occurred. All of these wheels were of the same size, with the same grit, but of different degrees of hardness. The grade *J* broke when the stress was 1650 pounds per square inch, the grade *K* at 1750 pounds per square inch, and so on. Therefore, one might infer that all grade *J* wheels would burst when this same stress was reached.

Now consider Fig. 2 and let us see what really happens when several wheels of supposedly the same grade are tested. We find that those that have been determined to be of grade *J* hardness will burst at stresses ranging from 1600 to 1700 pounds per square inch, grade *M* at from 1880 to 1790 pounds per square inch, and so on. In other words, a grade represents a range of values between definite limits. An understanding of this point is most essential to the users of grinding wheels and will explain many seeming variations in grinding wheel action and life.

Assume a certain snagging operation is being performed, whereby all the factors combine to bring a pressure against the grain on the face of the wheel which causes a stress represented by arrow *C*, Fig. 2. Bear in mind that this is a tangential or peripheral stress, so to speak, not a stress due to centrifugal force. The wheel whose bond has a strength represented by arrow *A* will have a longer life than one represented by arrow *B*. This last wheel will not be bonded strong enough to withstand the grinding forces and will wear away quite rapidly, in fact, much more rapidly than the difference in strength or hardness would seem to warrant. This point has been developed in detail because an understanding of it will eliminate many questions arising between the wheel manufacturer and the wheel consumer. It is needless to say that there is a close limit to the allowable variation and the manufacturer who best keeps within these limits, deserves the greatest confidence of the consumer.

The old idea of grinding considered it as a wearing down of the metal by rubbing or friction. This is now our understanding of the lapping process and modern grinding has progressed far beyond this point. However, if a wheel is bonded too hard for the work at hand, or if the wheel is too fine or composed of an inferior abrasive, the metal is actually rubbed or burned off, as shown in Fig. 3.

The modern grinding wheel of correct specifications for the work produces chips like thosesho wn in Fig. 4. Its action is similar to that of a steel milling cutter. On the face of the wheel are millions of cutting teeth at work every minute, and, although these teeth are not as large nor as strong as the teeth of a steel cutter, and cannot cut as deep, they are capable of working at a much greater speed.

In order for a wheel to cut fast and free, it is necessary for it to wear—that is, for the bond to release those grains that have become dulled and useless. From this it is seen that the grain, which has to the greatest degree the physical property of hardness (mineralogical hardness), com-

bined with sharpness, is the most efficient and will do the greatest amount of useful work before dulling. It is these very qualities that make alundum superior to the softer and more impure abrasive, emery, which dulls very rapidly under cutting pressures.

How Face Condition Affects Cutting

A set of experiments recently were carried out, showing how the condition of the face of a grinding wheel affects its cutting action, its ability to remove metal and the power consumed in doing this. The results are shown in Fig. 5, which represents the curve traced by the stylus of a graphic wattmeter connected to a motor-driven grinding machine. Section A of the curve shows the no-load power. Then a bar of steel was applied to the wheel under a given pressure and this pressure was held constant throughout the tests. What happened? First, the power consumpion climbed abruptly as the sharp cutting grain bit deeply into the metal. After two minutes of this rapid cutting, we reached the glazing point and the line *C* resulted At *D* we were working with a wheel, the cutting points of which were nearly all worn down flat. The power consumption was low because there was practically no useful work being done. The smooth grain simply rubbed and slipped over the bar. At *E*, the steel began to heat up and get sticky, so that particles began to load and smear into the pores of the wheel face. These respective conditions of the grains are illustrated diagrammatically from left to right above the curve. The power now climbed again, but still practically no useful work was being done. At *F*, or even before this point was reached, the wheel should have been dressed or resharpened. This aptly illustrates the folly of using a wheel that is too hard or dense to cut freely without resorting to continual dressing.

Action of an Ideal Wheel

The action of the ideal wheel is pictured in Fig. 6. This shows that the glazing period is no sooner entered upon, than the bond suddenly gives way and releases the dulled teeth. New and sharp grains take their place and the cutting is resumed at very nearly the initial rate. A wheel of the correct grain and grade for the operation at hand can oftentimes be dressed by the additional application of pressure on the part of the operator, or by presenting the very sharpest fins on a casting to the wheel face under increased pressure. This means that useful work is being performed while sharpening the wheel, with practically no lost time or wear of dresser cutters. It is this condition that all should aim for in selecting snagging wheels and the workmen should be educated to this kind of grinding.

Some think that in order to make a wheel cut, you must force it exceedingly hard. This is not true, if the wheel is not excessively hard or fine for the work. A wheel of the correct grain and grade will cut faster if you do not force it too hard. If these points are clearly understood, it will enable you to direct the grinding end of your business intelligently. Failure to grasp the essentials will prove disastrous to economy.

The next factor of importance to economy in the use of the grinding wheel in the foundry is a knowledge of the effect of the physical properties of the metal to be ground. To say that a wheel is desired for malleable iron may not be enough. This expression sometimes covers the annealed malleable and sometimes the white iron, before it has been annealed. If the iron is of the annealed variety, then alundum or an aluminous abrasive should be employed, but if the iron has not been annealed, then by all means use crystolon or some carbide of silicon abrasive. Furthermore, the white iron castings usually require wheels of much greater hardness than the annealed castings and this is readily understood when the difference in hardness, density and structure of these metals is known.

It is a common saying that the harder the metal the softer should be the grinding wheel. Strictly speaking, this applies only to precision grinding, certainly not to the snagging of castings. Let us consider manganese steel, which, as everyone knows, can be machined economically only with abrasives. This material offers a high resistance to penetration and hence, slightly finer grits are usually employed for snagging castings made of manganese steel than would be used for ordinary carbon steel. Coarser grits would require more manual effort than could be expected from the ordinary workman.

Soft, stringy materials generally call for comparatively coarse grits and medium hard grades. Dense, brittle materials require slightly finer grains and harder grades, sometimes one or both.

It is no doubt well understood that the harder the fins and the sharper the contact, the harder must be the grinding wheel. This is necessary to counteract the dressing and tearing action of the projecting metal.

In grinding steel castings, the breaking-off of gates and risers often

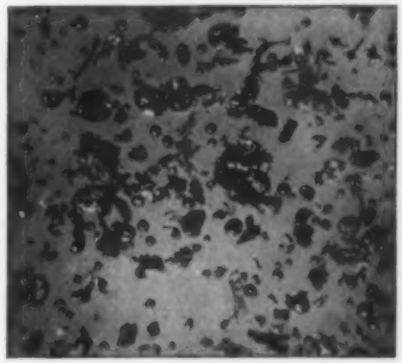


FIG. 3—CHIPS FROM AN UNSATISFACTORY WHEEL OR ONE IMPROPERLY OPERATED

leaves a very large volume of metal to be ground away. As the arc of contact thus increases there are increased loading tendencies, and sometimes a heavy, black oil is daubed on the metal to keep the wheel open and thus reduce dressing. After much experimenting, a specially treated or filled wheel has been developed that automatically lubricates the cutting grains and often greatly lengthens the life of the wheel because of reduced dressing. This filling is not thrown out by centrifugal force; it increases the life of the wheel and

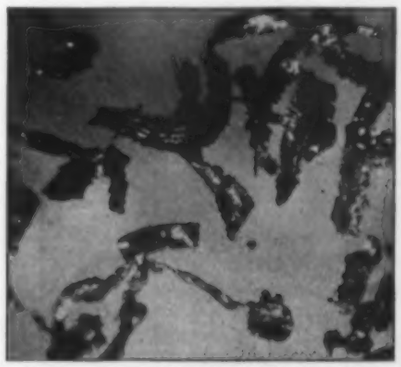


FIG. 4 — CHIPS FROM A PROPERLY OPERATING GRINDING WHEEL

many times causes faster cutting action because of the lubrication. In instances where the grinding is of a very rough, heavy nature, this special treated wheel shows up to very good advantage and it would not be economical to use anything else.

We now come to the third factor which has an important bearing on

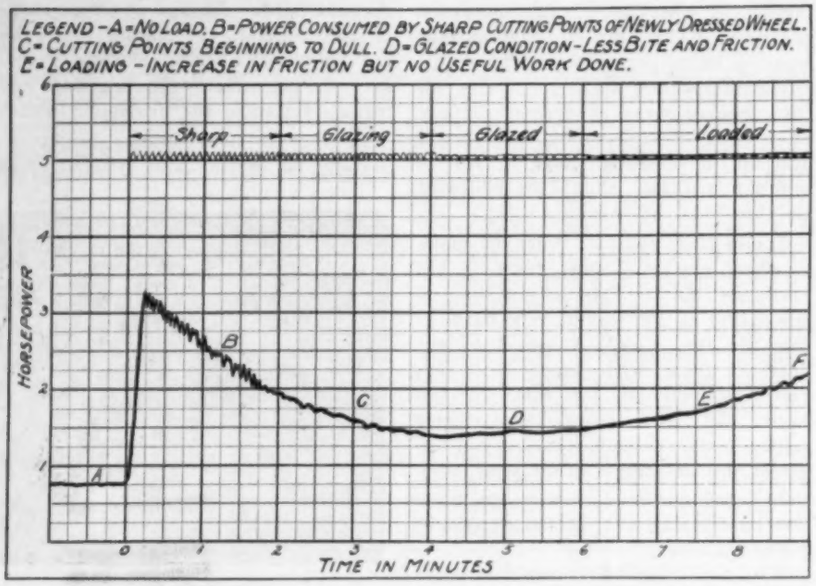

LEGEND - A = NO LOAD. B = POWER CONSUMED BY SHARP CUTTING POINTS OF NEWLY DRESSED WHEEL. C = CUTTING POINTS BEGINNING TO DULL. D = GLAZED CONDITION - LESS BITE AND FRICTION. E = LOADING - INCREASE IN FRICTION BUT NO USEFUL WORK DONE.
Sharp
Glazing
Glazed
Loaded
HORSEPOWER
TIME IN MINUTES
A
B
C
D
E
F

FIG. 5—POWER CONSUMPTION UNDER DIFFERENT WHEEL CONDITIONS

grinding wheel economy, namely, the condition of the grinding machine. Economy cannot be expected if the machines are light and shaky, or if the foundations are not solid. A grinding wheel that vibrates or jumps from any of these causes is soon pounded to pieces by the percussion set up by the castings on the face of the wheel.

A test conducted by an extensive user of grinding wheels for the purpose of determining whether or not it pays to install concrete foundations under the grinding machines, may interest you. This test was conducted with wheels of the same size and same grain and grade, on the very same machines and with identical castings. One set of machines was mounted on concrete or solid foundations and the other on wood or shaky foundation. The results were as follows:

Average life of wheels on wood floor, days	113
Average life of wheels on concrete floor, days	188
Increase in life due to solid foundation, per cent	65
Average saving a month per wheel on concrete floor	$2.00
Average yearly saving per wheel	$24.00

Where many wheels are used, this saving is a decidedly large and important consideration. In this case, the concrete foundation paid for itself inside of two months and the saving in wheels will go on indefinitely. As it was, several hundred dollars were saved by this company the first year that concrete foundations were used.

Loose and insecure mooring are also detrimental to the life of the grinding wheel. Don't wait until the machine begins walking around the foundry floor before remedying matters.

Similar figures could be produced to show the saving effected by keeping bearings in good condition. Excessive radial play and end play destroy the wheel rapidly. Many times complaints received to the effect that grinding wheels are not standing up as they formerly did, can be traced directly to bearing troubles. The introduction of harder grades only partially remedies matters because the speed of cutting is sacrificed and the operator has to put forth greater effort to do the same amount of work.

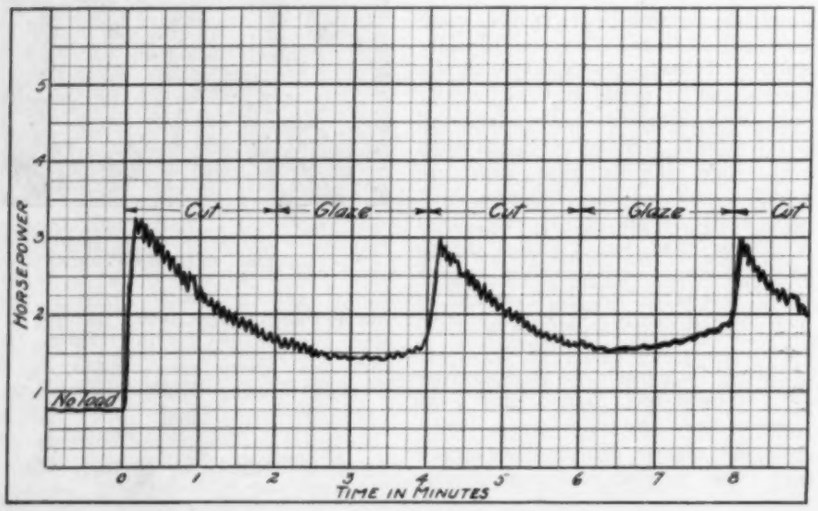


FIG. 6—ACTION OF AN IDEAL WHEEL

Grinding Large Castings

In the case of a medium-sized or large steel foundry, grinding quite a variety of castings, it is important to have the grinding machines properly arranged and grouped, so the work may be ground with a minimum amount of handling.

Extremely large castings that must be ground in place should be gone over with wheels mounted on small portable electric, pneumatic or flexible shaft grinding machines. In the case of the electric machines, all that is needed is a convenient lamp socket or a wall terminal.

Next should come a battery of swing-frame grinding machines to handle the medium-heavy castings such as drawbars, locomotive wheels and other similarly heavy castings that cannot readily be handled. These machines should be located where prompt crane service is to be had. Then finally, the smaller castings that could be easily handled should be ground on floor stands conveniently arranged.

The proper grouping of machines, segregation of castings, and prompt crane service will make for general efficiency in the cleaning operation. This should be looked out for by a man of good judgment who could also tell where to grind and where to chip. Much valuable time is lost in trying to chip off fins that could be ground off in a fraction of the time and with much less effort.

Speeds of Grinding Wheels

Much has been said and written about proper operating speeds for grinding wheels, but perhaps some important phases of this subject have not yet been made thoroughly clear. Generally speaking, the correct speed ranges for the grinding wheels used in snagging castings lie between 5000 and 6000 surface feet per minute. This is fairly well established and

quite generally accepted by the manufacturers of grinding wheels. This range was determined partly by long years of experience and partly by physical laws and the desire for an adequate factor of safety. The engineer building bridges, steel structures, machines and what not, recognizes the necessity for an adequate factor of safety and makes due allowance for it. Similarly, the engineer in making grinding wheels sees the great necessity for a factor of safety in operating speed. All snagging wheels made by reliable manufacturers are subjected to a speed test the last minute before being packed that generates a centrifugal stress many times in excess of the stress prevailing under the recommended operating speed. In the case of the Norton Co., this tested factor of safety runs from 2¼ to 3¼. This, then, is the first limiting factor to wheel speed.

Furthermore, it has been shown there is no appreciable gain from faster speeds, at least not enough gain to offset certain drawbacks. It should be further remembered that the grinding wheel is designed to operate at approximately the recommended speeds and any appreciable deviation calls for adjustments that are not always easy to make or conducive to efficiency.

Keep Surface Speed Constant

It is now common knowledge that it is necessary to keep the speed of the grinding wheel approximately within the recommended range, if its productive capabilities are to be maintained. It has been demonstrated that if a wheel's speed is allowed to fall to a very low level, or if it is speeded up beyond a certain point, in both cases reduced cutting ability for the same amount of effort expended is the result. In the case of a subnormal wheel speed, not only does the productive capacity fall off, but also, there is excessive wheel wear.

To illustrate this point, let us consider the case of an 18-inch wheel used for snagging steel castings. At 1175 revolutions per minute its peripheral speed is 5500 surface feet per minute, and it cuts and wears satisfactorily. If the revolutions remain the same, at 11 inches diameter, the surface speed is reduced to 3500 feet. What is the result? Every cutting grain on the face of a revolving grinding wheel has a definite amount of energy stored up in it. It is the expenditure of this energy that enables the grain to do useful work and remove metal. Now the energy available varies as the square of the surface speed. Therefore, at 11 inches diameter, the cutting grains have only 40 per cent of the energy that they had at 18 inches diameter and they cannot be expected, therefore, to grind as rapidly. Also, because of the decreased energy stored up in each grain of abrasive, it is less capable of withstanding the resistance offered by the steel and hence is more readily torn from its setting. This, then, explains the difficulty that will be encountered in attempting to grind at very low surface speeds.

On the other hand, if this same wheel was giving satisfaction at 5500 surface feet per minute, and an attempt were made to speed it up to 7000 surface feet, no greater production would be realized. This is due to the glazing effect resulting from the increased duty imposed on each abrasive grain.

Keeping a fairly constant surface speed by increasing the revolutions as the wheel wears down, is the proper procedure for maximum cutting ability with minimum wear. This relation of life of wheel to speed is perhaps more clearly indicated in Fig. 7, representing actual results of tests conducted in a large foundry. The curves show the rate of decrease in wheel life as the surface speed drops off. The continuous straight line is for a wheel lasting 150 hours, wearing uniformly from 18 inches to 9 inches in diameter. Surface speed at the start was 5400 surface feet per minute, and, the revolutions per minute being maintained constant at 9 inches diameter, the surface speed of the wheel was reduced to 2700 feet. At 5400 surface feet per minute and full diameter, all of the wheels tested start off at a 200 or 250-hour pace. However, before the speed has been reduced 300 surface feet, we notice a change in the slope of the curve indicating reduced life. At 4000 surface feet per minute, 13 inches diameter, the falling off is most pronounced and instead of obtaining 150 hours of wheel life, it ranges all the way from 100 to 135 hours. Had these wheels been speeded up at 15 inches diameter and again at 12 inches, the 150 hours life would have been more nearly attained.

When a user of grinding wheels wishes to avoid the trouble of maintaining fairly constant surface speed, he invariably tries to keep his wheel

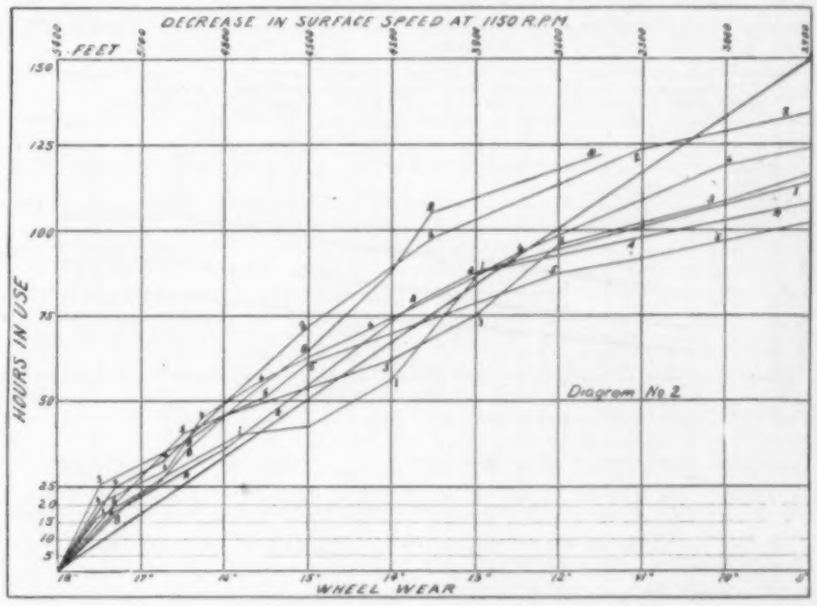


FIG. 7—RELATION OF LIFE OF WHEEL TO SPEED

life up by using wheels of excessively hard grade. The immediate effect of this is increased power consumption and decreased speed of cutting, neither of which are desired. Fig. 8 shows that regardless of speed, successively harder grades require more and more power to remove the same amount of material.

It is, therefore, quite evident from the foregoing that economy in wheel life comes from maintaining fairly constant surface speed as the diameters of the wheels are reduced. This can be brought about by using variable speed motors, or by having machines running at graded speeds, to which the worn wheels are shifted at given sizes.

The next point that requires careful consideration is the personal factor entering into the use of snagging wheels. No two men will get the

same life or production from a grinding wheel, even though the work and conditions are identical. If the foundry is large and there is a constant duplication of work so that the piece rate can be used, then it is safe to say that harder wheels must be used than where day rate compensation is in force. However, the ideal condition that permits the wheelmaker to specify a free-cutting wheel, is where there is a premium paid for maximum production with minimum wheel wear.

The Human Element

Some men work the corners of the wheel hard, others are abusive in applying the castings, and still others think they must remove a quarter of an inch of abrasive in dressing, where a sixteenth of an inch would be ample. All of these factors have their effect, and must be allowed for. It is, therefore, important that some kind of a record should be kept, showing just how each grinder uses his wheels. Many times the grinding wheel manufacturer is blamed unjustly for apparent variations in wheel life and hardness. In some of these instances the true causes can be attributed to the operation of this personal factor. For instance, if a wheel should happen to be on the soft side of a certain grade and it should get into the hands of a grinder who was very hard on grinding wheels, a certain life and production would be obtained. Now, in the same lot of wheels, there might be one that varied slightly the other way or toward the hard side. Suppose that this was used by a man who was more careful in using his wheel. It is evident the wheel would last very much longer under these conditions and hence from a very slight and permissible variation in hardness of wheel, we get a result that would indicate a wide variation, if the personal factor is not considered. This is not idle speculation. It is stated from observation of actual cases.

Where there is a constant duplication of work and the piece-rate is used, there is a very simple but serviceable method for computing the relative efficiency of various grinding wheels and operators. The operator's earnings on a given class of work per dollar cost of wheel may be considered, under these circumstances, as a very fair means of determining the efficiency of the particular wheel used. To encourage operators to use their wheels economically, a bonus or premium is sometimes paid for all earnings in excess of a given figure. This works out very satisfactorily and means that the competent grinder is rewarded for his competency. It also invariably means that free-cutting wheels will be used and hence maximum production is obtained.

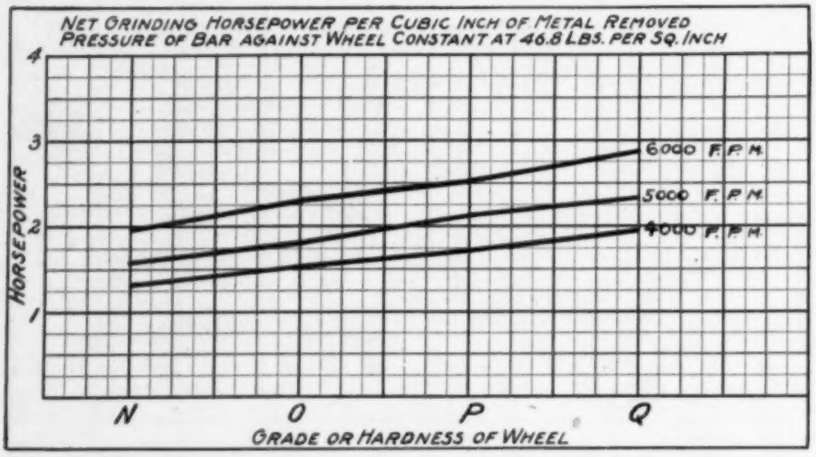


FIG. 8—RELATION OF HARDNESS TO POWER CONSUMPTION

Records on Snagging Castings

Here are some actual figures obtained from snagging wheels that are interesting:

Life, hours	Weight of castings, pounds	Average per hour, pounds
127	26,543	208
157½	27,043	172

If no records were kept, the wheel with longer life and slightly greater total tonnage, would undoubtedly have been picked as the more economical to use. However, the wheel with 127 hours life produced 20½ per cent more castings a day and the profit on this increased production more than offset the slightly increased abrasive cost.

Another large consumer of snagging wheels keeps a tabular record on printed cards of the following: Date; pieces ground; weight, pounds; hours of grinding; earnings; and wheel loss on diameter. These figures permit of the calculation of the abrasive cost per ton of castings ground, and the earnings per ton of castings ground. Manifestly, it is desirable to keep the abrasive cost as low as is consistent with satisfactory earnings per ton. Keeping such records as these makes it easy to pick out the correct grinding wheel, and enables the foundryman to tell just what each of his grinders are doing. He can also tell what the wheel manufacturer is sending him, without guesswork, or resorting to hearsay evidence from a few of the operators. This is decidedly practical and works for economy. It is time large foundrymen paid more attention to this phase of manufacturing cost, for nowhere is it easier to save or lose large sums than in the cleaning operations where grinding wheels are used.

Here is an example which shows that it is worth while to keep adequate grinding records. A certain large producer of draw-bars was using a hard wheel. It had fairly long life and turned out a large number of bars before it was used up. On the other hand, the grinders were continually complaining that they had to work too hard and dress too often. Finally the grinding wheelmakers were called into consultation and a test carried out with several different grains and grades of wheel. The result was the choosing of a wheel, one grade softer. The complaints ceased as soon as this wheel was put into general use in the foundry, and although the wheels were used up faster, the production was greatly increased and the overhead correspondingly reduced. A brief analysis of this will show up the facts to better advantage:

	Hard wheel	Soft wheel
Grinding cost per ton ground	$0.49	$0.55
Total number pieces ground.	1800	800
Pieces ground per hour.....	8	10.2

The use of the softer wheel increased grinding cost 12 per cent, but increased production 27 per cent and lowered overhead charges because of the increased tonnage turned out in the same time with the same equipment.

Every foundryman who operates a foundry of any size should try to work out a system that would apply to his particular conditions. Let him consult the wheelmaker if necessary and take advantage of whatever experience he has acquired in handling many similar problems. It does not cost very much to investigate, but

it is decidedly expensive to continue operating year after year with inefficient and wasteful methods of snagging and cleaning.

A discussion of grinding wheel economy would hardly be complete without some mention, at least, of the necessity of making the use of this tool safe. It is not economy to allow the work to get jammed in between the wheel and the rest, because the wheel undoubtedly would be broken. This is prevented by keeping the rests adjusted close up to the face of the wheel. It is not economy to have one or more grinders going to the hospital every little while to have a foreign body removed from the eye. This can be prevented by supplying an approved type of glass goggle, making the men wear them while grinding. Much trouble also has been caused from flying pieces of chilled iron dresser cutters, which break in the dressing operation. This can be eliminated by using hooded dressers. State laws are beginning to call for closer attention to such features.

Apart from the humanitarian side of this question, it is undoubtedly more economical to employ safeguards where rapidly revolving grinding wheels are used than to trust to chance that there will be no accidents. The cleaning of castings is heavy and wearing work at best, and the least that the foundryman can do is to make the working condition as safe and bearable as possible.

Coal Production Increases

In commenting on the report of coal production prepared by the geological survey, Director George O. Smith points out that coal shortages cannot be attributed to the failure of the soft-coal mines to produce more coal than in the past. Coal producers on Sept. 1 were about a month ahead of their 1916 production and expect to finish the year with an increase of 10 per cent over 1916, the banner year, and of 25 per cent over 1915.

The tremendous increase in manufacturing and transportation activity this year has created a demand for soft coal in excess of any in the past, an increase in demand that is difficult to measure in terms of tons but that is certainly more than the 10 per cent which production has increased. To meet this demand the mines have been producing soft coal at a rate never before equaled. In the second week of July, 1917, the average daily production was more than 1,900,000 tons, the highest point ever attained; in the middle of August the lowest rate for the summer, 1,638,000 tons, was recorded; and in the last week of September the daily rate was 1,823,000 tons. In the first eight months of 1917 the output of soft coal was 368,500,000 tons, or 37,000,000 tons more than in the first eight months of 1916. In the same period shipments of anthracite increased 16 per cent over those of 1916.

The production of beehive coke at the mines for the first seven months of 1917 was 23,213,752 tons as compared with 23,627,472 tons for the first seven months of 1916.

Scrap Accumulation on Farms

The department of the interior calls the attention of farmers to the fact that even at the recently fixed prices of iron and steel it should be possible for most farmers to reap an overlooked profit through the sale of the old iron and steel scattered about their premises; that the saving of such old scrap metal will help to meet the present serious deficiency in the supply of iron and steel; that the use of the old metal will accomplish savings in coke which is now to be had only at unprecedented prices; that the delivery of the old iron and steel at foundries far from iron mines and big steel centers will correspondingly relieve the excessive strain on the mines, some of the furnaces and the railway and boat traffic in the coke and iron producing districts. A considerable part of this junk is already on wheels with tongue and whiffletree attached, ready in fact to be "walked on its own legs" to the freight station.

According to the census returns there were in 1910 about $1,265,000,000 worth of agricultural machinery alone on the 6,361,520 American farms. Farm implements, not including stoves, chains, tools, etc., valued at about $65,000,000, are sold annually. A considerable part of the cost of manufacturing this farm machinery lies in the metals used, and the metals include not only iron and steel of various grades and values, but occasional small parts of brass or copper.

Bureau Conducts Census

The United States bureau of mines, at the request of the council of national defense, and aided by the American Institute of Mining Engineers and the American Chemical society, recently completed a census of mining engineers, metallurgists and chemists, with the result that 7500 men engaged in mining and 15,000 men engaged in various chemical industries have been classified according to the character of work in which each one claims proficiency. Van. H. Manning, director of the bureau of mines, in explaining why this census was taken, makes the following statement:

"In the organization of a great army many classes of specialists are needed, and the problem is to get the best qualified men for each place. Men with a knowledge of sanitation are essential to the health of the soldiers at the various training camps. Men with an intimate knowledge of pyrotechnics find a place in the manufacture and use of certain signal devices; telephone and telegraph operators are essential for systems of rapid communication, without which valuable time may be lost. Mining engineers, under military control, may be of the greatest assistance in a military way in planning and directing sapping operations; in the digging of trenches; in the erection of special supports such as concrete and steel for trenches, dug-outs and tunnels behind the lines, and in planning systems of ventilation and drainage for such excavations; in rehabilitating or redeveloping wrecked coal and iron mines taken from the enemy, and in increasing the output of minerals for military uses in other districts. Further, the experience of some mining engineers in the use of oxygen mine-rescue apparatus might be invaluable in the exploration of underground saps or dugouts filled with poisonous gases. It is on the theory of being able to place the right man in the right place at the right time that this census has been conducted."

British Finished Iron on High Price Level

The average net selling price of finished iron in Birmingham, Eng., for the months of July and August, 1917, was $74.41 a gross ton, according to data compiled from the records of 17 selected companies and submitted by Consul E. H. Dennison. Following is a table compiled from the same data showing the different classes of iron sold and the average net selling price per gross ton:

	Weight, tons	Average net price
Bars	20,913	$72.45
Angles and tees	964	74.67
Plates and sheets	508	88.09
Hoops, strips and misc.	7,652	78.83
Total	30,037	74.41

Steel Supports High Tension Lines

Towers Built of Structural Shapes Are Used Widely for Electrical Transmission Lines—The Design of These Towers Intimately Influences the Use of Electricity in Industry

THE transmission of electrical energy bears a twofold influence upon the iron and steel industry. The advent of electric motors as driving units during the last five years has been so rapid and the demand has been so keen that the entire electrical industry has been subject to the pressure. The use of electrical equipment in steel mills for driving blooming rolls and supplementary machinery has necessitated the transmission of huge quantities of power. It is patent, therefore, that, with the exception of a few plants where current is generated locally, the development and expansion of electrical steel mill equipment must parallel similar progress in the transmission of electricity.

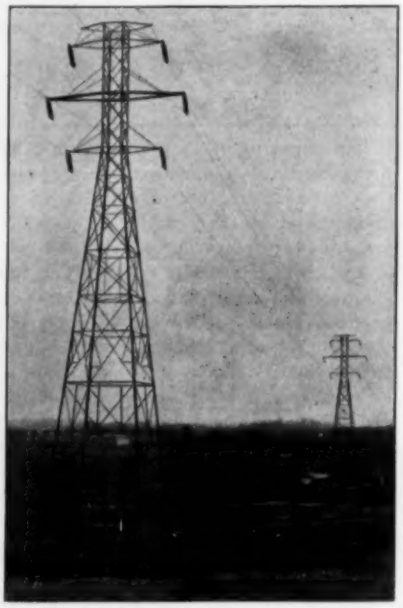
Tonnage is Considerable

Indeed, the industries have been revolutionized to such an extent that now the consumption of steel for transmission towers ranks as a highly important factor in the structural steel market. Ten years ago, practically no steel was rolled into sections for transmission line towers; today, basing the estimate on pre-war figures, the annual tonnage devoted to this purpose amounts to well over 50,000 tons. This figure represents 1.6 per cent of all the structural shapes made in this country in 1916.

Although all the towers produced do not carry transmission lines to steel mills or other industries closely allied, the preponderance of electrical trunk lines serve plants either producing or using iron and steel. The development of towers and accessories such as suspension insulators has been an important factor in the adoption of electrical energy for industrial purposes. In designing transmission lines to serve blooming mills, in particular, and other large power consumers, engineers have had to contend with the difficult problems of surges and extraordinary peak loads not ordinarily experienced on lines serving residences and other individually insignificant consumers of electrical energy. Hence, both from the standpoint of the tonnage of steel consumed and because of the possibilities high-tension lines have either of limiting or increasing the use of electrical equipment in large industries, the transmission of electricity is a problem of extreme importance.

Changing economic conditions gradually are spelling the doom of small power plants. The small electric central station, whether at present serving a community or private consumer, soon will be as obsolete as the plant equipped exclusively with steam-engine drive.

Except in steel plants where energy is available from gas reclaimed from furnace stacks and other isolated cases



FIFTY-FOOT EXTENSION TOWERS CARRYING LINES OVER RAILROAD-RIGHT-OF-WAY

where power is a by-product, it seems more than plausible to believe that industries in the near future will be supplied with power from huge central stations located, not near the centers of demand as at present, but at the sources of natural energy.

Centralization Near Power Source

To vindicate this belief we have the enormous hydroelectric power stations at Niagara Falls, at Keokuk and numerous other points in the south and in the west, where water power is available. The energy generated at these modern power stations is carried for miles, serving almost limitless territories, on steel towers that form the backbone of highly efficient, 60,000 to 150,000-volt trunk lines. Work is in progress at the present time on a mammoth central station in West Virginia at the mouths of coal mines. Power generated here will be carried into the industrial districts of Ohio, western Pennsylvania and Kentucky and, due to the saving effected by generating the electricity at the source of supply, it will be available to consumers at greatly reduced rates. This scheme obviates the high cost involved in transporting coal to the power plant.

Advantage of Steel Towers

From a theoretical standpoint, there is a very definite and close relation between the length of span and the cost of erection of a transmission line. The fewer the towers, the less the cost. With but little additional cost per pole, steel poles may be employed in place of wooden ones, permitting of greater distances between towers and hence, effectign no little saving in the entire cost of the line. Another factor which necessitates the added strength of the steel pole over its wooden predecessor is that as power is transmitted longer distances, higher voltages are employed for economical reasons. But as the electromotive force of the current transmitted is made higher, larger and heavier insulators become imperative. This added weight is often beyond the strength of wooden poles. These reasons, together with the fact that suitable cedar and chestnut poles are becoming scarcer and more expensive, make the use of steel for high tension towers an economic and engineering prerequisite.

In general practice, where topography is favorable, the minimum height of towers is about 25 feet. The size is determined largely by the length of span, the character of the span (whether over smooth or uneven country) and the type of circuit to be carried. The most economical system of power transmission has been found to be a 3-phase circuit. Two circuits often are used for trunk lines to insure continuity of service. These circuits can either be supported on one so-called double tower or arranged in parallel lines on single towers. An example of modern transmission line construction is illustrated by the new single circuit line for the Knoxville Power Co., in Tennessee. The voltage of this line is 150,000, the towers are from 42 to 80 feet high, ranging in weight from 9600 to 20,000 pounds. The average span is 420 feet.

Transmission structures vary widely

in shape and design, but for the sake of convenience they may be divided into three distinct classes:

1.—Self supporting towers, built with three or four legs, are designed to withstand the pull and strain of one or several conductors. If the tower is designed to withstand only the emergency strains imposed by one or two broken cables, it is called a suspension or intermediate tower. If it can resist the strain of all broken cables, it is called an anchor tower.

2.—Flexible bents or *A* frames are rigid in a direction normal to the line and are capable of taking the wind loads on the wires but are dependent upon the conductors to hold them in position in the line.

3.—Poles made up of three or four angles, latticed or bottom plated, with narrow bases are included in a third class. This type is used for light line construction.

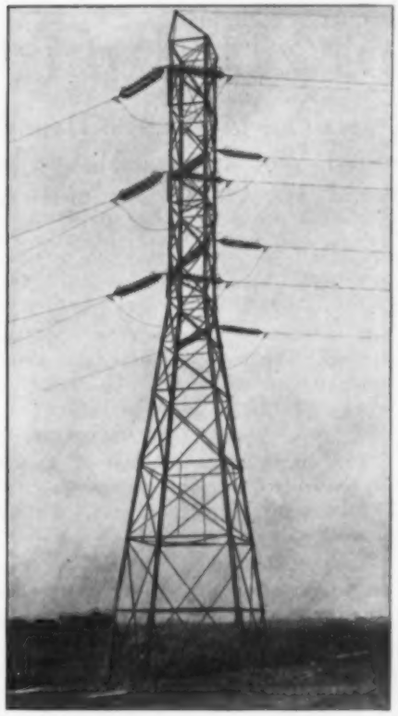
Factors Influencing Design

In designing transmission towers, allowance is made for the weight of the wires of the adjacent spans, wind pressure, and in cold climates, for the ice and snow. Towers are also seriously affected by broken wires, and if the line has a curvature, the angle between wires. Usually the ice coating is assumed to be ½ inch and is combined with a wind velocity of 60 miles per hour or 8 pounds per square foot of projected area of the wires. On base wires, a wind velocity of 80 miles per hour or 15 pounds per square foot is considered.

Towers are usually built up of single sections, mostly angles. Only in unusual cases such as spans for river crossings are the members made of built-up sections. Heavy towers are universally mounted on concrete bases; lighter ones, however, are usually anchored to the earth by special steel grills. These bases are designed to transfer the horizontal pull diagonally to the surrounding earth. Tests have shown that these grills may be built to withstand a pull on the anchorage of 150,000 pounds.

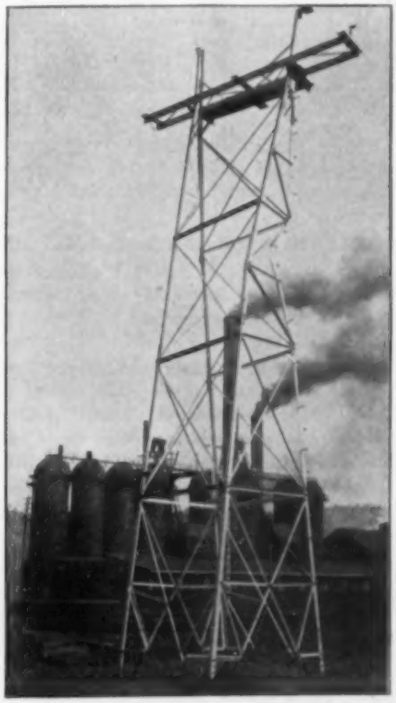
One of the largest plants for the fabrication of transmission line towers is the Shiffler works of the American Bridge Co., at Pittsburgh. The tower plant of the company at Ambridge, Pa., has a capacity of 800 tons per month but is equipped only for punching and galvanizing. Work requiring riveted or forge work is handled at the Shiffler plant. All detail drawings and templets are also made at this plant.

The tower plant is equipped with punches, shears and bending machines. A battery of five punches, which may be spaced to any required distance, permits of punching an angle 50 feet long with five sets of holes at one operation. A double rack punch is designed to punch holes on any number of gage lines varying as little as 1/16 inch



DEAD-END TOWER AT SUBSTATION

merely by a lever adjustment. The galvanizing department has three sulphuric acid tanks, a water tank, a nitric acid tank and a spelter tank. The spelter tank is 25 feet long, 2½ feet wide and 3 1/3 feet deep. The material receiving yard is equipped with a 25-ton gantry crane of 80-foot span. This is also used



THIS VIEW SHOWS THE NATURE OF FAILURE OF A TRANSMISSION TOWER

for shipping purposes when the pieces are too heavy to handle by hand.

Each tower member is marked with a key number to facilitate assembly in the field. This character is both painted and stamped before galvanizing to insure permanency. Due to the superior rust-resisting qualities of galvanizing, this process has almost entirely replaced painting as a protection against the ravages of weather. Even when the towers are painted, the steel anchors are galvanized to resist the corrosive action of the earth. In connection with the tower plant, the company has built a tower testing frame 68 feet high. The power for testing is obtained through a hand screw of 50,000 pounds capacity. Towers are either tested on their own foundations or upon a special mount of 24-inch I-beams.

South African Mill Rolls Scrap Rails and Bars

Characterizing the activities of the Vereening Steel Works, situated about 40 miles from Johannesburg, as representing a new era in South Africa's industrial life, the *Johannesburg Star* in a detailed description recently covered the functions of this plant. An extract of the article has been sent to this country by John P. Bray, United States consul at Johannesburg. The plant at present, according to the account, rolls 16, 20, 25 and 30-pound rails, rounds from ⅝ to 3 inches, and squares of similar thickness. It relies upon the railroads for its raw material, having contracts with several under which it acquires their accumulation of iron and steel scrap. It is expected, however, that the works will be enlarged shortly so that it will be able to smelt ore from the Pretoria iron fields. The company employs in the works, exclusive of those in the offices, about 230 men, the majority of whom are Caucasians.

A Hartford branch of the Connecticut section of the American Society of Mechanical Engineers has been organized with more than 100 members, making the fifth in that state. It has elected the following officers: B. M. W. Hanson, works manager of the Colt's Patent Fire Arms Mfg. Co., chairman; H. P. Maxim, inventor, vice chairman, and Sherwood F. Getter, chief engineer of the Hartford Steam Boiler Inspection & Insurance Co., secretary and treasurer. The branches which represent the Connecticut section are Hartford, Bridgeport, New Haven, Meriden and Waterbury, all but the last one being organized.

Standards for Industrial Ladders

Too Much Carelessness Features Our Methods of Handling Ladders—The Following Standards, if Observed, Would Materially Reduce the Number of Ladder Accidents Which Frequently Are Fatal

THE term *Fixed Ladder* as used in these regulations means a ladder that is substantially fastened to a structure in a fixed position.

The term *Portable Ladder* as used in these regulations means a ladder with but one section, which is used transiently at various locations.

The term *Extension Ladder* as used in these regulations means a ladder consisting of two or more parallel sections traveling in guides or brackets so arranged that it may be adjusted to variable lengths.

The term *Portable Step Ladder* as used in these regulations means a ladder so constructed as to be self-supporting.

The term *Fire Ladder* as used in these regulations means a ladder used exclusively for fire purposes.

The term *Trolley Ladder* as used in these regulations means a ladder the movement of which is confined in permanent guides or ways at top or bottom, or both.

The term *Sectional Ladder* as used in these regulations means a ladder consisting of two or more sections so constructed that the sections will telescope into each other.

The term *"A"-Ladder* or *Scaffold Ladder* as used in these regulations means a ladder whose parts, each equivalent to a straight ladder, are hinged at the top to form equal angles with the base.

Section 1—*General*

a Where stairways are not provided, fixed ladders should be used for access to elevated positions; where fixed ladders are not suitable, portable ladders should be used.

b Ladders shall be numbered, or otherwise designated, and regular inspections shall be made of their condition.

c The use of broken or weak ladders, or ladders with missing rungs, is prohibited.

d When defects develop to such an extent that the ladder is to be permanently discarded, it shall be destroyed.

e Side rails, where wood is used, shall be straight-grained. Knots one-half (½) inch or less in diameter will be permitted when they are in the center of the rails. The following thoroughly seasoned woods should be used: Northern spruce, Oregon pine, Norway pine, yellow longleaf pine, or Oregon fir.

f Rung shall be inserted in holes in the side rails and kept from turning, and shall not exceed fourteen (14) inches in length at the top.

g Wooden rungs shall be straight-grained, free from splinters, and absolutely free from knots. The following wood should be used: White ash, white oak (3rd growth), or hickory.

h Steps, where wood is used, should be constructed of the following woods: Northern spruce, Oregon pine, Norway pine, or oak.

i Ladders shall have a uniform step or rung spacing of twelve (12) inches on centers. [Mason ladders having a uniform spacing on centers of ten (10) inches and fire ladders having a uniform spacing of fourteen (14) inches excepted.]

j Ladders shall be equipped with devices designed to prevent slipping. (Fixed ladders, portable step ladders, and "A"-ladders excepted.)

Section 2—*Fixed Ladders*

Ladders designed to reach safety valves, cut-outs, etc., where speed of operation may mean a saving of life, should always be of a permanent type, securely fastened, and constructed of steel or iron.

a Ladders having side rails are preferred to the type made of U-shaped section embedded in wall or fastened to stack, etc.

b The pitch of ladders shall not be such that a man's position is necessarily below the ladder when climbing.

c Side rails, where metal is used, shall be not less than three-quarters (¾) of a square inch in cross-section. A minimum size of two (2) inches by three-eighths (⅜) inch should be used. Where wood is used, they shall be not less than six (6) square inches in cross-section and shall be dressed on all sides. A section one and three-quarters (1¾) inches by three and three-quarters (3¾) inches (2 by 4 dressed) would be suitable for this purpose.

d Splice plates, where metal is used, shall be of the same size and material as side rails and shall be double-riveted or -bolted. Bolts or rivets shall be countersunk on inside and shall be not less than one-half (½) inch nor more than five-eighths (⅝) inch in diameter, where cross-section does not exceed that of two (2) inches by three-eighths (⅜) inch. Where wood is used, there shall be splices on outside of side rails and joints shall be double-bolted. Carriage bolts shall be used. All splice pieces shall be chamfered at the ends.

e Rungs should be round. Where solid metal is used, they shall be not less than five-eighths (⅝) inch in diameter; where pipe is used, they shall be of equivalent strength; where wood is used, they shall not be less than one and one-half (1½) inches in diameter and the tenon shall be at least one (1) inch in diameter or its equivalent in strength.

f Distances from front of rungs to nearest permanent object back of the ladder shall be not less than six and one-half (6½) inches. There shall be a space clear of all obstructions in front of the ladder from bottom to top, of at least thirty (30) inches forward and of at least fifteen (15) inches either side of the center line of the ladder. [Ladders equipped with wells (cages) or their equivalent shall be excepted.]

g Ladders over thirty (30) feet in length should be provided with wells, unless the ladder is built in zig-zag sections and provided with platforms between sections.

h Fastenings shall be made of material equivalent in strength to the rails. Fastenings shall be made to wall by building in, by through bolts, or by expansion bolts grouted or leaded. The maximum vertical distance between fastenings or braces shall not be in excess of ten (10) feet.

i Ladders to landing shall extend a distance of at least forty-five (45) inches above the landing, preferably being goosenecked. The rungs may be

Editor's Note

This code was presented before the American Society of Mechanical Engineers, at the spring meeting, Cincinnati, May, 1917, by the sub-committee on the protection of industrial workers. William A. Viall prepared the original material. In addition to Mr. Viall, the sub-committee consisted of John Price Jackson, chairman; John H. Barr, Melville W. Mix, M. W. Alexander, W. P. Eales, G. R. Olshausen, John W. Upp and Carl M. Hansen.

The word "Shall" where used in these regulations is to be understood as mandatory and "Should" as advisory.

omitted above the roof. Where a man must step a greater distance than eighteen (18) inches from ladder to roof, tank, etc., a platform shall be provided.

Section 3—Portable Straight Ladders

a Ladders over thirty (30) feet in length should not be used.

b Side rails shall have a minimum cross-section equivalent in strength to a northern spruce rail of the following dimensions:

	Inches
Up to and including 10 feet.....	2⅜ x 1⅜
Over 10 feet up to and including 18 feet	2¾ x 1⅜
Over 18 feet up to and including 26 feet	3 x 1⅜
Over 26 feet up to and including 30 feet	3½ x 1⅜

c Side rails should be spread so that the width of the ladder at the bottom will be greater than the width at the top, preferably by a taper of one-quarter (¼) inch per foot of length.

d Rungs shall be equivalent in strength and wear to an ash rung of the following dimensions:

	Diameter, inches	Tenon, inch
Up to and including 24 inches in length	1¼	⅞
Over 24 in. up to and including 30 inches in length....	1⅜	⅞

e Portable ladders should be fully protected at their bases to prevent slipping. For use on wood or earth the bases should be provided with case-hardened steel spurs; or a disk similar to the one furnished by the National Affiliated Safety Organizations, consisting of a case-hardened disk, held in position on dowel pins by springs, cotters and nuts, is recommended. These spurs shall be kept sharp. On concrete floors, pivoted shoes with lead or carborundum faces may be used.

f When used on iron floors an attendant should be placed at the foot of each ladder.

g Whenever possible to use ladders with a gooseneck or hook at the top, these should be provided, as forming the best protection against accident.

Section 4—Extension Ladders

a Table 1 should be followed in the construction of extension ladders.

b Ladders should be equipped with safety locks.

Section 5—Fire Ladders

a The construction, use and maintenance of industrial fire ladders shall conform to the specifications herein set forth covering portable straight ladders (Section 3, Par. *a* excepted).

b A uniform step or rung spacing of fourteen (14) inches shall be used.

c Fire ladders should be painted red and shall be plainly marked "For Fire Purposes Only".

d Fire ladders shall not be used for any other purpose than that for which they are intended.

Section 6—Portable Step Ladders

a Ladders over twenty (20) feet in length shall not be used.

b Side rails shall have a minimum cross-section equivalent in strength and wear to a northern spruce side rail of the following dimensions:

	Inches
Up to and including 12 feet.....	⅜ x 3
Over 12 feet up to and including 16 feet	1 x 3½
Over 16 feet up to and including 20 feet	1 x 4

c Front and back rails shall be so spread when the ladder is open that the spread at the bottom, inside to inside, shall be greater than the spread at the top, inside to inside, by an amount equal to or greater than one and one-half (1½) inches per foot of length of ladder. Minimum width between side rails at the top step, inside to inside, shall be not less than twelve (12) inches, with a taper of at least one (1) inch per foot of length of ladder.

d Steps shall be equivalent in strength and wear to a northern spruce step of the following dimensions:

	Inches
Up to and including 12 feet.....	¾ x 4½
Over 12 feet up to and including 16 feet	⅞ x 4¼
Over 16 feet up to and including 20 feet	1 x 4½

e Steps shall be trussed and screwed or bolted to the side rails. Nails shall not be used as sole fastenings.

f An automatic locking device to hold the front and back rails securely in position shall be an integral part of each ladder.

Table I

Data on Extension Ladders

Side Rails: Up to and including 44 feet long: Material, Norway pine, clear and straight-grained, free from knots. 48 feet to 60 feet long: Material, Oregon fir, clear and straight-grained, free from knots.

Rungs: Material: Oak, ash or hickory, straight-grained, free from knots, and live and tough. Dimensions: 1¼ inches diameter at center; taper to 1⅛ inches diameter, straight-turn to ⅜ inch diameter for holes in side rail.

LADDER DIMENSIONS

Length, ft.	Dimensions of side rails (cross-section same at both ends), in.	Distance between side rails, top section, in.	Distance between side rails, bottom section, in.	Vertical distance between rungs, in.
20, 22, 24, 26	2¾ x 1⅜	12¼	14¾	12
28	2¾ x 1¾	14¼	17	12
32, 36	2¾ x 1¾	14	17	12
40	3⅛ x 1⅜	15⅜	18⅜	12
44	3¼ x 1⅜	17¾	20¾	12
48, 52	3½ x 1½	17½	20¾	12
60	3⅝ x 1¾	18	21⅜	12

Section 7—"A"-Ladders or Scaffold Ladders

a Ladders over twenty (20) feet in length should not be used.

b Side rails shall have a minimum cross-section equivalent in strength and wear to a northern spruce rail of the following dimensions:

	Inches
Up to and including 12 feet.....	1¼ x 2¾
Over 12 feet up to and including 16 feet	1½ x 3
Over 16 feet up to and including 20 feet	1½ x 3½

c Side rails shall be so spread that the width of the ladder at the bottom, inside to inside, shall be greater than the width at the top, inside to inside, by an amount equal to or greater than one and one-half (1½) inches per foot of length of ladder.

d Supports shall be equivalent in strength and wear to an ash bearing one (1) inch by two (2) inches. They shall be straight-grained and absolutely free from knots, shall have tenons not less than five-eighths (⅝) of an inch by two (2) inches, secured in place with wire nails. They shall be not less than three (3) inches from the top of the side rails. They shall be eighteen (18) inches on centers, and shall be staggered. The tops of side rails shall be cut on a bevel to prevent them from spreading. Hinges shall be wrought or malleable iron, bolted or riveted to side rails.

Section 8—Trolley Ladders

a Ladders shall be suspended from tracks fastened securely to the ceiling or to the framework with which the ladders are connected. Tracks should be of wrought iron or wood, and should be tested to double the maximum of load for marginal safety. Tracks shall be constructed so that it is impossible for the wheels to jump the track, by having the wheels in pairs situated on opposite sides of a vertical flange or by having the track so shaped that it completely encloses the sides of the wheels. The extreme front and back wheels shall have a horizontal distance of at least eighteen (18) inches between their centers.

b The track wheels shall be rigidly fastened to the top of the ladder with suitable steel or wrought-iron brackets. These brackets may be fastened to a bolt connecting the two side rails of the ladder or to the top step. In the latter case the top step shall be provided with extra metal braces to the side rails.

c Side rails shall have a minimum spread, inside to inside, of ten (10) inches.

d Side rails shall have a minimum

(*Continued on page* 1167)

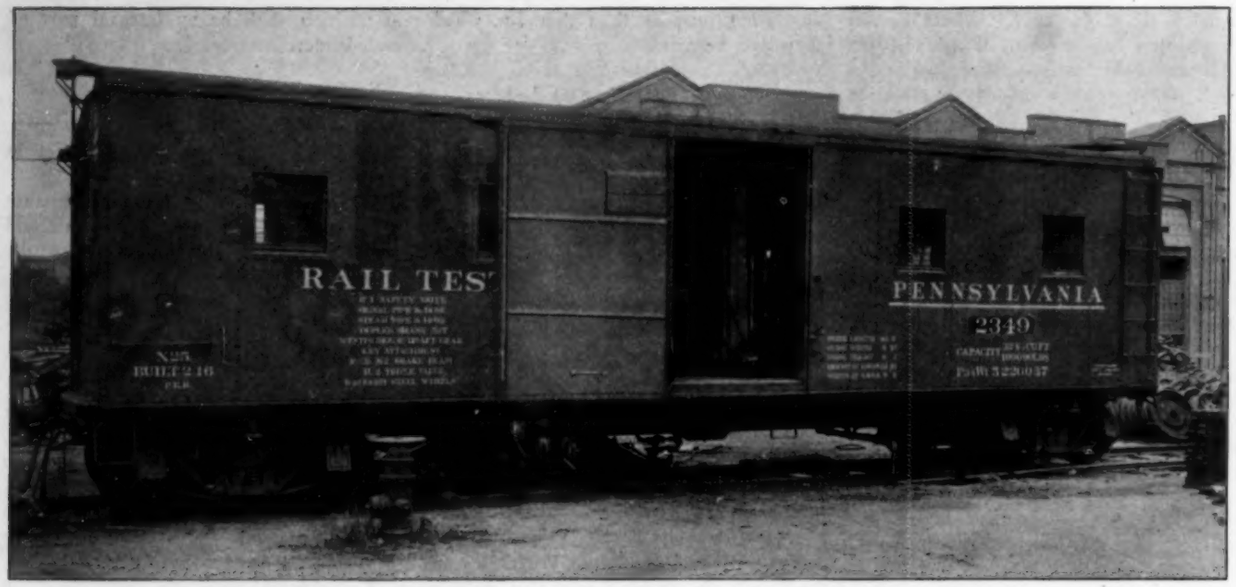


Fig. 1—Exterior View of Test Car Showing Position of Testing Apparatus

Quick Bend Method of Testing Rails

THE Pennsylvania railroad system first introduced the drop test into its specifications for carbon steel rails in 1900, at which time the entire output of rail steel was produced by the bessemer process, which, due to the resulting high phosphorus content, imparted the predominant physical property of brittleness to the rails. Due to this fact, some form of shock test was required to eliminate such rails as showed excessively brittle characteristics, the drop test proving most adequate for this purpose.

However, rails of open-hearth steel have come into general use since 1908, and at the present time practically all Pennsylvania railroad orders for rails specify open-hearth steel, which, being low in phosphorus content, has the chief physical property of ductility and is much more tenacious for a corresponding hardness than bessemer steel.

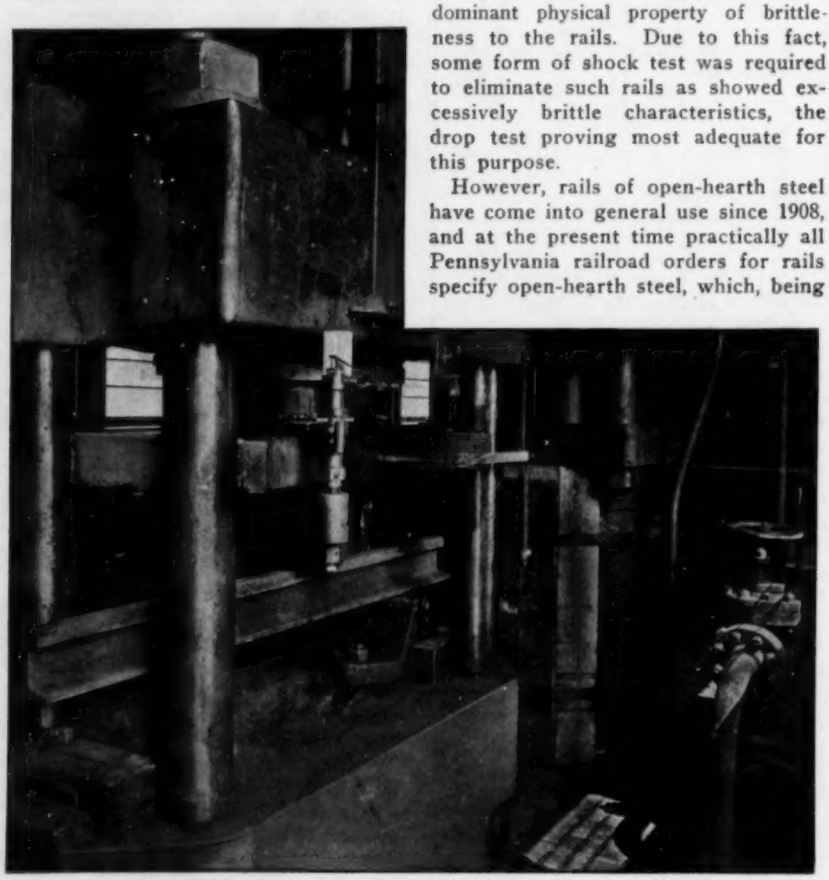


FIG. 2—GENERAL ARRANGEMENT OF TESTING APPARATUS

It has been the experience of the Pennsylvania system that the standard drop test of open-hearth rails gives such a paucity of information that it precludes the possibility of drawing definite conclusions regarding the relative merits of rails from the different manufacturers. The limited data obtainable from this method of testing seem to indicate, owing to their slight variations, that most all open-hearth rails have approximately the same physical properties. For this reason it was believed an investigation should be conducted in order to determine the fitness of a transverse rapid bending test as an alternate or substitute for the present drop test of rails, with the object of obtaining more conclusive information relative to their physical properties, such as elasticity, ductility and hardness of the rail material.

This investigation was accordingly made on authority given by the Pennsylvania railroad system rail committee in April, 1915. The subcommittee appointed to conduct this investigation submitted a report entitled "Rail Tests, Quick-Bend Method", which was reviewed by the rail committee in November, 1916. Conformable to the recommendation of this committee an appropriation for the purchase of a machine proposed by the subcommittee and its installation on a

suitable car for use in making parallel quick-bend tests in conjunction with the standard drop test of rails rolled on the 1917 schedule, was approved by the board of directors on Nov. 22, 1916

Quick-Bend Test Machine

The machine, which was built by the Southwark Foundry & Machine Co., Philadelphia, was delivered on April 16, 1917, and immediately placed in service. It consists of a hydraulic press and intensifier, the design and operation of which were made to conform to specifications outlined under the supervision of J. T. Wallis, general superintendent of motive power.

The press is of the four-column inverted type having a clear distance of 3 feet 4 inches x 12 inches between columns. The main ram, 16-inch diameter x 12-inch stroke, is cast solid with the moving platen, which is guided on the four columns. The twin pull-back rams, 6 inches in diameter, are symmetrically located at the sides of the main ram, and are connected with the moving platen by 1¾-inch rods. The overall dimensions of the press are 5 feet 6 inches x 3 feet 1 inch base, x 8 feet 11½ inches in height. The maximum clearance between the moving platen and base of the press is 2 feet 2 inches. The total weight complete with the loading head and two supports is approximately 22,000 pounds.

The intensifier is 9 feet 6½ inches high and has a base 2 feet 11 inches x 2 feet 11 inches. It is of the single pressure type and has a total weight of approximately 11,000 pounds. The ram which extends from the high pressure cylinder to the base pressure cylinder is integral with the base pressure piston, and has a total stroke of 36 inches. The diameters of the ram and base pressure piston are respectively 9 inches and 26 inches, which give a step-up ratio of about 8.35 to 1. The high pressure intensifier cylinder is directly connected with the press ram cylinder through a 2-inch extra heavy pipe provided with a 2-inch check and stop valve.

The operation of the machine is controlled by a bronze three-way valve, having balanced exhaust. By admitting 450 pounds per square inch line pressure to the base cylinder of the intensifier, the pressure in the high pressure cylinder and, consequently, in the ram cylinder of the press, is raised to approximately 3760 pounds per square inch, developing a total capacity in the press of about 756,000 pounds. The 36-inch stroke of the intensifier ram actuates the entire 12-inch travel of the main ram by intensified pressure alone, thus assuring a smooth continuous curve on the indicator card.

The machine was accurately calibrated in order to ascertain its actual effective working pressure. It is said to be so designed that no more than 60 per cent of its total capacity is necessary for maximum test requirements, which prevents undue strain and wear on the parts. Safety guards are arranged around the machine to prevent the broken pieces from flying when the rail specimens rupture under test.

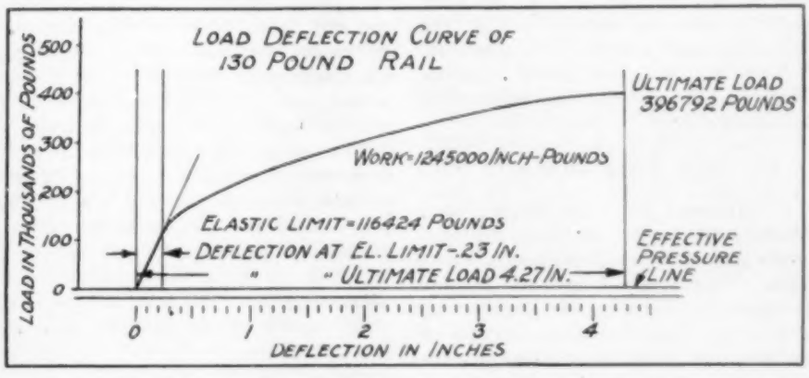


FIG. 3—INDICATOR DIAGRAM SHOWING INCREMENTS OF DEFLECTION AND CORRESPONDING PRESSURE

Pressure Indicator

A hydraulic indicator is used for registering the pressure required for a relative deflection of the specimen, the indicator being in direct communication through a ½-inch pipe with the main ram chamber, the movement of the indicator drum being actuated by the stroke of the main ram. The general arrangement of the indicating apparatus is shown in Fig. 2.

The rail test specimen, properly marked, is placed on the supports of the press and pressure is applied through the loading head on the ram, at the center of the rail, until rupture of the specimen occurs. During this action, which requires approximately seven seconds, an indicator card showing increments of deflection and corresponding pressure is taken. A reproduction of such a card is shown in Fig. 3. The abscissas of the curve indicate deflections, whereas the ordinates obtained in each case represent the load in thousands of pounds. The elements taken from the card are the deflection and load at the elastic limit and the ultimate strength. The work required to fracture the specimen is also obtained from the card.

Machine Can be Transported

The machine is installed on a modified all-steel box car of 100,000 pounds capacity, the general arrangement of which is shown in Fig. 1.

It has been demonstrated from comparative drop and quick-bend tests that rails which have met the drop test requirements showed undesirable physical properties when subjected to the quick-bend test. The narrow limitations of the drop test when compared with the advantages of the quick-bend test in the determination of the ranges of elasticity and ductility of the steel would seem to warrant the adoption of the quick-bend method of testing rails, and the data obtained from the program of tests being conducted on this year's rolling are to be thoroughly analyzed with a view to establishing a specification adaptable to the quick-bend test.

Spelter Output Drops Off in Third Quarter

Estimating on the return of 95 per cent of the production, C. E. Siebenthal, of the geological survey, gives the output of primary spelter during the third of this year at 156,600 short tons, or approximately 24,000 tons under the average of the preceding two quarters. Of the amount produced, 132,700 tons came from domestic ore and 23,900 tons from foreign ore. Adding to the primary spelter that which had been distilled from skimmings, drosses, etc., the total output for the first nine months of this year was 444,267 tons. Stocks of spelter at smelters on Sept. 30 aggregated 47,186 tons, or an increase of about 17,000 tons over the supplies on June 30, and 30,000 tons on the first of the year. At the end of the third quarter, 64,626 retorts, or 28 per cent of the total amount, were idle. The zinc content of ore imported was 15,000 tons. Complete export figures were not available, but during July and August 19,600 tons of spelter were shipped abroad.

Effect of 8-Hour Day on War Work

Prominent Manufacturer Expounds the Practical Bearing on Shop Management of the Projection Into Many Plants of the Limited Work Day Required Under Government Contracts

BY W. H. VAN DERVOORT

A GREAT many of our American manufacturers today are being called upon to do government work. They naturally have been studying the problem as to how they can best handle this work without interfering to any considerable extent with their regular organization and their regular methods of operating their factories. The manufacturer cannot stand back, if he is loyal, and say that he will not do government work because of the restrictions of the 8-hour law, but he will take hold of the work and do it to the very best of his ability and he should do it under those conditions that will least disturb his regular operating work. It has been my opportunity to study into this thing rather carefully. I can speak to you from the standpoint of a manufacturer who is interested in the handling of government contracts and in handling them in such a way that they will not disrupt his organization.

Confronted by Many Problems

As one of those who took early contracts, there have been a number of questions which came to our attention, and it has been difficult to get information as to how we could handle them. We have not in any way desired to transgress the law nor do we advise anyone to attempt it. The mere fact that you get a government contract and cross out the lines referring to the 8-hour law, even though the government would sign the contract, does not release you from the obligation of the 8-hour law, for it is on the statutes and must be observed. As the law now stands, you are privileged to operate a man as many hours as you can agree with him to work, but the basic principle of time and a half beyond the 8-hour period is still in force and must be abided by. This status of the law brought the question up to us as to piece work and premium work; after eight hours, must the piece rate be multiplied by one and a half, and if so, how could we handle it? It would require an amount of bookkeeping that would be almost impossible to take care of. We received a decision from the bureau of ordnance in the war department that in operating on the piece work basis it recognized the principle that the workman did as much in the eighth hour or the ninth hour or the tenth hour as he did in the first, second or third hours. We were rather glad to have them admit that one point. If we were operating a man say, at a 10-cent piece rate for eight hours and wanted to operate that man on the same piece rate for 10 hours, then all we had to do was to increase the piece rate 10 per cent, to 11 cents per hour, and that gave the man his straight rate for eight hours and gave him a rate and a half for the two hours overtime. That system simplified our bookkeeping materially.

Best Operating Basis

I presume that practically every manufacturer now handling big contracts is working on a piece or premium basis. This makes it possible for him to give his employes a liberal wage and to get the product out in the required time. Now, if you have a workman who is employed on an hourly basis and he fails to make in 10 hours at his premium rate, as much as he would have made on his hourly basis when computed under the law, then you must make that extra money up to him. Naturally, if that employe cannot make, at piece or premium work, as much as he would make at his hourly rate under the law, you are not going to retain his services. For that reason I feel that practically every manufacturer who can handle his work in that way, will be able to go along in a comparatively smooth way. We have been operating our plant now for four or five months on government work, and the questions of overtime, the 8-hour day, etc., have never once come up.

Have Needless Fears

I think that many of the manufacturers are really more fearful than they need be as to the effect of this 8-hour law on their work. Our work at present is divided up about equally between government and private contracts. We attempt to figure our piece rates so that the men get the same in both lines, and it has really been surprising how little discomfort has occurred from the handling of the work in that way. There is one thing that we have adopted, which I would recommend to any employer doing government work, and that is the system of keeping an individual time record of every workman. In that way, if any question ever arises, you can turn to that particular individual record and point out how that man worked, the number of hours he put in on a certain day, the amount of money he received at piece or premium rates, the hourly rate as agreed on with him in your individual contract, and that the man made more on that day than he would have made at his hourly rate computed under the law. That is only a suggestion; I feel, however, that it will be wise for the manufacturers to follow some such program out of protection to themselves. We are bound to have labor spies in our plants, who, the moment you do something irregular or subject to criticism, are going to report it, so let us be prepared to always show that we have an absolutely clean record in the case of each and every employe.

Effects of Law

Nothing prevents you from operating a man on government work eight hours and then detailing him to other duties for one or two hours more. That does not demand excess pay. You are not, however, privileged to operate a man say eight hours a day for five days in the week, and then work him five hours on the last day; if you do, it is not a weekly rate. It is a daily rate. And if you work a man more than eight hours on strictly government work, then you must pay him overtime, regardless of the total number of hours that he works in the week.

Another question comes up relative to the operation of the law. A great many manufacturers feel that a certain article that they are making comes under the law, when, in reality, it does not. Take the matter of aeroplanes—as you know, they have been excepted; motor trucks do not come under the law, nor do wagons, and many of the things that you might think would come under the law because they are made to government specifications. You do not have to consider the difficulties of the law in connection with that work. As to gen-

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The author of this paper, which was presented at the recent meeting of the National Founders' association, is associated with Root & Van Dervoort Engineering Co., East Moline, Ill., and is president of the National Metal Trades association.

eration of power, the handling of water, those things do not come under the law. In the operation of your plants, those general operations which you must perform in the regular process of your business, do not come under the law. If 50 per cent of the power generated at a power plant is used on government work and 50 per cent on regular work, the men employed are not working under the 8-hour law. The same applies to equipment for handling material and the maintenance of tools and buildings. However, those things which are regularly manufactured by the United States government as a manufacturing plant do come under the operation of the law unless specially excepted, and I believe that it is the disposition of both the navy and the war departments to be as liberal as possible in that matter.

When Work Falls Under Law

There is the question, if you are working for the government, as to when or what stage of the process, the work falls under the law. We are advised that if it is an article say, like a gun forging, that it begins with the fabrication of the steel from the billet. Of course, there is no question as to guns and the mounts and ammunition of all kinds—they all come under the operation of the law.

The question of tools also is a vital point; when do the tools which are to be used on these jobs come under the law? I have not been able to get it thoroughly clear in my mind. In general, I believe that it is fair to assume that if the tool or the article that you make for the execution of work that comes under the law is to be worn out or destroyed in the process of the work, that the making of it falls under the law If, however, it is an article that you could put in your stockroom and six months or a year or five years later, you could use it again for the production of that work, that it does not come within the law. However, I am not too positive on that point. Small forgings, cast iron and steel castings that are regularly manufactured for the government come under the law; the making of the patterns, the making of the molds for making those castings, also comes within the law.

Closed Shop Unthinkable

I have here a letter that was sent out by Mr. Drew to the members of his association, and I just want to read, in closing, one paragraph: "That the government should operate or demand a closed shop on war work is unthinkable." An analysis made of the situation shortly before the war came on, indicated that only 10 per cent of the tradesmen were organized. Now it seems absolutely preposterous to think that those 10 men can wield the other 90 per cent. Here we have a case: The President, the other day at Buffalo, lauded the workmen for their loyalty; the next day 10,000 men went out on strike in the district around New York.

There is something wrong somewhere in this labor situation. Workmen were never receiving as much money as they are receiving now and there is not a manufacturer that objects to the money that he is paying his men. I say that the men are entitled to more money, they are entitled to 50 per cent—yes, they are entitled to double the money they would get under normal conditions. We have got to have the material; there is a shortage of labor and everybody has got to work longer hours and work harder and faster than ever before.

I am dead against the idea of cost plus percentage contracts; they are wrong for the government and are not good for the manufacturer. They are affecting labor more than any other thing I know of at the present time, and I say that we, all of us, must get under this proposition although we must handle our men fairly and honestly; we must give them good wages and we must keep them contented and on the job.

Urges Study of Payrolls

Never in the history of this country was labor as independent as it is at present. I do not know that we can criticise the workmen for being independent; everybody is independent when he has got the balance of power on his side, and yet I feel that the manufacturers, even today, are not studying their payrolls as closely as they ought; they are not going around voluntarily increasing a man here and a man there; they are forgetting certain classes of their labor entirely, and the greatest mistake is when you forget the man that is not organized. The man that is organized is taking care of himself, but the man that is not organized is largely dependent on the manufacturer for fair play, and too many manufacturers are not giving to those men the attention they ought to have.

I want to call your particular attention to your office help, your clerical help. Do you go around and give this stenographer another $5 advance in monthly pay as often as you ought? Do you give the clerks, the time men your attention as often as you ought? You can win the confidence of your employes in that way quicker than you can in any other way; anticipate him, beat him to it. I believe that all of you can establish amicable relations with your men if you will all bear this one thing in mind, be just as fair to your employe as you would like to have him be to you.

Industrial Ladders

(*Continued from page* 1163)

cross-section equivalent in strength and wear to a northern spruce side rail three and one-half (3½) inches by seven-eighths (⅞) inch.

e Steps shall be equivalent in strength and wear to a northern spruce step four and three-quarters (4¾) inches by three-quarters (¾) inch.

f Steps, where metal is used, shall be flanged downward not less than two (2) inches at both ends and secured by two bolts or rivets to each side rail. Where wood is used, they shall be inset in the side rails one-quarter (¼) inch, glued and nailed; all, or at least alternate steps, shall be braced to the side rails with metal brackets placed under the steps.

g The base of the ladder shall rest on two wheels or castors.

Section 9—Sectional Ladders

a The bottom section shall be six (6) feet in length and shall have a minimum spread between rails at the base, inside to inside, of twenty-one (21) inches.

b Sections (intermediates) shall be six (6) feet in length and shall have a minimum spread between rails at the bottom, inside to inside, of thirteen (13) inches.

c The top section may converge with a minimum spread between rails at the bottom, inside to inside, of thirteen (13) inches.

d Side rails shall have a minimum cross-section equivalent in strength and wear to a northern spruce side rail of the following dimensions:

	Inches
Up to and including 5 sections....	2¾ x 1⅝
Over 5 sections	3⅛ x 1⅝

e Rungs shall be equivalent in strength and wear to an ash rung one and three-sixteenths (1-3/16) inches in diameter with seven-eighths (⅞) inch tenon.

Safe Practices

Use care in placing portable ladders before using them. If there is danger of ladder's slipping, have some one hold it. Do not place ladders too straight or at too great an angle, or they may fall, break or slip.

Never place ladders in front of doors opening toward the ladder.

Ladders should never be placed against window sashes. Screw a board across top of ladder to give bearing at each side of window.

Step ladders should be fully opened

and locked in all cases before anyone steps on them.

Always face ladder when ascending or descending.

Do not go up or down a ladder without free use of both hands. If material has to be handled, use a rope.

Never slide down a ladder.

Never use broken or weak ladders or ladders with missing rungs.

When defects of construction develop to such an extent that the ladder is discarded, it should be destroyed.

Ladders withdrawn from service for repairs should be sent to the repair shop or tagged as "Dangerous—Do Not Use".

See that ladders you use have safety feet, and, where necessary, safety hooks at top.

Short ladders should not be spliced together, as they are not strong enough to be used as long ladders.

Safe practice demands that ladders be numbered, classified and subjected to careful and periodic inspection. Ladders should be kept clean and free from dirt or splashings of paint or material. Imperfections or defects are not readily observed unless ladders are kept in good condition.

Iron and steel ladders should be coated with a preservative paint or composition. Wooden ladders, if used out of doors, should also be carefully treated with a suitable preservative.

A satisfactory practice is the storing of ladders upon brackets by arranging them against wall in such manner as to permit inspection without moving ladders.

Storage of ladders involves a separate problem. Shelter should be provided in all cases. If placed upright, 75 degrees will afford a safe angle; if racks are used, place the ladder on edge rather than flat; this will prevent trouble and danger of accident in withdrawing the ladder for use.

Safety bolts and hooks should be provided when the character of the work demands the attention of the workman or constitutes an element of danger.

Manganese in Arkansas

The United States geological survey has issued a bulletin describing the manganese deposits of the Caddo Gap and De Queen quadrangles, Arkansas. These deposits, which are located in west-central Arkansas, have been worked only in a very small way, and up to the completion of an examination on Aug. 13, 1916, yielded less than 200 tons of marketed ore. Most of the work was done during two periods of activity, one beginning about 1885 and ending in 1889, and the other beginning in 1915 and still in progress. The earlier period occurred in the midst of the excitement over gold and silver that raged for a few years in west-central Arkansas, especially in Garland and Montgomery counties.

The present mining operations are confined almost entirely to the mountainous districts in the northern parts of the Caddo Gap and De Queen quadrangles. The first work was done in August, 1915, when 58 long tons of ore carrying 48.5 per cent of manganese was mined and shipped from the Nelson mine, an open cut on Nelson mountain, five miles north of Glenwood, and 25 tons of ore from Pigeon roost mountain, 1½ miles from McKinley crossing on the Memphis, Dallas & Gulf railroad. Pigeon roost mountain is just east of the Caddo Gap quadrangle. Very little other work was done during 1915.

In 1916, however, the work was taken up again. Various companies were formed for the purpose of mining and prospecting. The activity of individuals and companies has aroused much interest among the farmers and other people of this region and many of them have prospected and were still prospecting their lands and numerous mining claims in August, 1916.

The manganese ores of the Caddo Gap and De Queen quadrangles consist of oxides, four of which, psilomelane, pyrolusite, manganite and wad, have been identified; if others are present, they probably occur in minute quantities. Although these minerals may be found separately, as a rule two or more are intimately mixed in the same deposit, and in some places they are associated with iron ores and manganiferous iron ores. Psilomelane, pyrolusite and manganite form the larger part of the manganese ore in this region. A material consisting of rock fragments and clay cemented together by soft manganese oxide is present at a number of places; locally it is known as "bog ore".

Psilomelane is a black or steel-blue mineral that breaks with a conchoidal fracture, shows in places botryoidal surfaces, and occurs in the amorphous form and with a massive, concentric or stalactitic structure. It has a specific gravity of 3.7 to 4.7 and a hardness of 5 to 6, which means that a knife blade scratches it with difficulty, if at all. The chemical composition of psilomelane is not definite; potash, baryta and water occur in it in varying amounts and are supposed by some mineralogists to be mechanically admixed. An analysis of psilomelane is given below.

Pyrolusite is a grayish-black to black mineral with a crystalline or granular structure and a black or bluish-black streak. It has a hardness of 2 to 2.5, being much softer than psilomelane and a specific gravity of 4.8. Pure pyrolusite contains 63.2 per cent of metallic manganese, but the mineral is usually impure.

The manganese ores occur as nodules, pockets and short irregular veins from a fraction of an inch to 4 feet thick. Thicknesses of 4 feet, however, are rare, and those of a foot are not common. The ore bodies are scattered through the hard novaculite, and can doubtless be found on every mountain where the Arkansas novaculite is exposed. The ores occupy bedding planes or joint cracks or form a cement in a novaculite breccia, in which the rock fragments range from a fraction of an inch to over a foot in diameter. The iron and manganese ores may be intimately mixed in the same pocket or vein, they may occur separately in different parts of the same vein, or they may occur in separate masses.

Economic Possibilities

The quantity of manganese ore that can be mined at a profit from any one deposit is small, which means that under normal conditions manganese mining will never become one of the chief industries in this region.

The aggregate amount of manganese in the region is undoubtedly large, but it is distributed over an extensive area, and in almost all places it is hopelessly scattered through the rock in small nests and seams. If these nests and seams were in sufficient quantity the rock might be crushed and the ore concentrated by washing, but the pockets containing them are too small to permit the expense of machinery. It is a popular idea that the ore will increase in quantity at a depth, but there is absolutely no reason to expect this, as such deposits are just as likely and sometimes even more likely to become poorer at a depth than they are to improve. From the nature of the deposit it is to be expected that the ore at a depth is, at the very best, no more plentiful than in the surface outcrops of the so-called "lodes"—that is, that it exists as a series of pockets separated by greater or less distances of barren rock.

The plant of the Pacific Coast Steel Co., Youngstown, Wash., has been practically closed down, following a strike recently of about 400 unskilled laborers. The men claimed that a union agreement under which they had been working was violated. As a result of the cessation of activities at the plant more than 200 skilled employes were thrown out of work.

British Prices Uncertain

Coal and Coke Advances Cause Iron and Steel Makers to Seek Higher Figures—Labor Costs High

Bureau of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., Nov. 2, 1917.

PROBABLY at no time during the war has there been such uncertainty as to prices as now prevails. Within the next week or two consultations will take place between manufacturers and the minister of munitions to secure the settlement of prices. It is becoming increasingly evident that all kinds of iron and steel will come under review. It is now settled that coke will go up 6s 4d ($1.52) per ton in four districts, namely, Nottinghamshire, Derbyshire, Yorkshire and Lancashire, as the result of the half crown per ton put upon coal. Foundry coke will be advanced 7s 6d ($1.80). Durham and Wales have not stated their prices. It is, however, expected that they will be advanced in the same ratio. It is agreed by the ministry that a substantial rise in coke must carry with it higher pig iron prices. The advance in coke probably would be met by a rise of 10s per ton ($2.40) in pig iron. But it is pointed out that since the present selling prices were fixed the prices of lime and ironstone, with other necessaries, have been advanced, while wages have become an exceedingly serious problem. A rise of £1 ($4.80) per ton, it is said, would not be excessive. All contracts include a retrospective clause applying the rise whenever it comes. It is expected that the whole range of pig irons, including basic and various brands of hematite, will share in this advance.

Labor is Scarce

There is great pressure for supplies. At Birmingham yesterday some of the largest firms declined all bookings, in view of heavy contracts. The scarcity of labor has become a serious matter, and it is common for blast furnaces, when accepting orders, to protect themselves against specified weekly deliveries. Some furnaces are unable to load iron, for lack of labor, and the singular experience is presented of foundries standing idle for want of iron lying on the furnace's bank waiting shipment. The stringency of pig iron is increased by the worn condition of the furnaces.

In the northern district the tone is reported to be firm and steady, with an increasing demand. The demands for November, as applied to the control committee, are well in advance of those for October, but in the Cleveland district it has been found possible to make the increased allotments, as the furnaces are working well, and some additional plants have been brought into operation. In fact, some arrearages of business lately have been overtaken. Some increase has taken place in exports. The warrant stock continues stationary at 887 tons. At present there is not enough east coast hematite to go around. Buyers are receiving assurances, however, that all needs will be met by additional furnaces which are to start shortly.

Ask Advance on Finished

The representatives of the finished iron trade will next week ask for higher prices. The amount to be asked for is not determined and cannot be until the pigmakers have received their advance. Other grievances and claims will be brought forward. Makers of finished iron have felt the pinch rather badly of late. They have had no advances for 12 months in standard classes of iron, and during the interval wages have gone up three, four and five times, while every article used in the forge and mill costs considerably more. On wage matters, the parties have not always been able to agree, and settlements have been reached only after arbitration settled under the auspices of the ministry of labor. The general effect has been a large increase in the cost of production. The ironmaster will make a strong effort to get this back from the ministry of munitions.

Steel which has escaped price movements for a long time is likely to be involved on this occasion, and it is quite possible that there will be some extension of authority over certain classes of discard material. Discard shell steel has its price fixed by the ministry, but other kinds of discard steel have been allowed to escape with the result that eager buyers have been offering fancy prices. Some of the steel has been realizing as much as £19 to £19 10s per ton ($91.20 to $93.60), although soft finished steel is not allowed to be sold at more than £18 ($84.40).

The government still is placing orders extensively but light steel, wire, etc., for aeroplane and airship construction occupy a conspicuous position. Among the orders placed this week was one for 200 tons of sheets, passed through a Birmingham merchant, on behalf of the American government. These sheets, it is understood, are intended to be used as shelters or for other protective purposes for the American soldiers in France. Every week the government seems to be able to tighten its hold upon the output. All ordinary uses of steel are in suspense. A significant step by steelmakers is the insertion in their contracts of a similar clause to that used by pigmakers immediately applying to contracts any price advance subsequently declared by the government.

The output of sheets, tinplates, tinned sheets and similar light material is restricted through scarcity of raw material. Some use is being made of discard steel, though this is inadequate. In Sheffield, basic billets are said to be more plentiful, but acid steel is decidedly deficient. Large quantities of stainless and other light steels are being made for aircraft purposes. The steel mills are working to their utmost capacity, and, wherever possible, output is being increased. The output of shipbuilding material and shell steel is very great. Exports are practically restricted to the allies. The demand for black sheets, especially the heavier gages, is very great. The sheet trade appears to be restricted almost to black sheets. Galvanized sheets are nearly extinct. Puddled bars are decidedly scarce, and although the recent price of £12 10s ($60) is considered high, sellers are holding their present stocks for an advance. The coal problem becomes increasingly difficult.

Mill to Start

Operations of the new zinc rolling mill of the American Zinc Products Co., at Greencastle, Ind., will be started early in the spring, according to an announcement just made. The mill will contain 10 stands. The company recently perfected its organization by the election of the following officers: President and treasurer, D. W. Kerr; vice president, F. W. Stillwagon, both of Warren, O.; vice president and general manager, H. S. Buck, Greencastle, Ind.; and secretary, R. A. Leitch. The executive committee is composed of Edward Langenbach, Canton, O.; Wade A. Taylor and D. W. Kerr, Niles, O.; and F. W. Stillwagon, Warren, O.

The plant of the United States Machine Co. at South Williamsport, Pa., which recently was purchased by the Lycoming Foundry & Machine Co., has been remodeled as a foundry and is about to be placed in operation.

Men of the Iron Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

FRANK L. Estep has resigned as chief engineer of the Tennessee Coal Iron & Railroad Co. to become chief engineer of the Nova Scotia Steel & Coal Co., New Glasgow, Nova Scotia. Mr. Estep was associated with the Tennessee company for almost eight years, coming to it as assistant engineer from the Cambria Steel Co., Johnstown, Pa. He was made chief engineer of the Tennessee company upon the resignation of E. J. Best, July 1, 1912. Frank H. Crockard, president of the Nova Scotia company, also was formerly connected with the Tennessee company, having resigned last June as vice president and general manager.

Maj. Henry L. Higginson, Boston, has been elected a director of the Submarine Signal Co., in place of Admiral Francis T. Bowles, resigned.

Porter McConney has been placed in charge of the newly established Detroit branch of the Detroit-Standard Roller Bear Co., Philadelphia.

L. E. Taylor, Youngstown, O., has been placed in charge of the sales offices recently opened in Washington by the Republic Iron and Steel Co.

J. E. Johnson Jr., 52 William street, New York, has just returned from a trip to China, where he went on a special mission.

W. R. Yagle, formerly associated with the Lawrence Steel Castings Co., Pittsburgh, has become office manager of the Hall Steam Pump Co., that city.

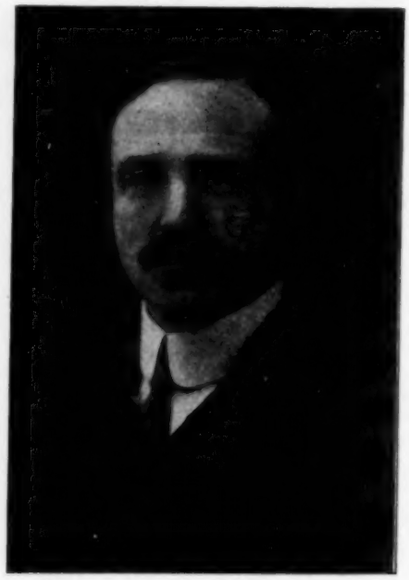
W. F. Trenary Jr., with headquarters at Birmingham, Ala., now represents the Harrison Safety Boiler Works of Philadelphia, succeeding W. R. Jennison.

John L. Haines, general manager of the Jones & Laughlin Steel Co., Pittsburgh, has returned to that city after a prolonged visit in the east, where he had gone to benefit his health.

Lewis A. Way, formerly superintendent of the Duquesne Steel Foundry Co., Pittsburgh, has accepted a position as assistant to the president of the Lewis Foundry & Machine Co., Pittsburgh.

Frank P. Carpenter, Manchester, N. H., has been elected a director and president of the Mead-Morrison Mfg. Co., Boston, to succeed ex-Gov. Eugene Noble Foss of Massachusetts, resigned.

William Kerr, manager and assistant treasurer of the General Chemical Co.'s Philadelphia office, has been elected a director of the company,



JAMES FRATER TAYLOR

succeeding Edward H. Rising, deceased.

Hon. J. Lovell Johnson, president of the Iver Johnson Arms & Cycle Co., Fitchburg, Mass., has announced his candidacy for the Republican nomination for congress in the Fourth Massachusetts district.

C. W. Neubig, formerly with the New York office of the S. K. F. Ball Bearing Co., has accepted a position as general sales manager of the Rickert-Shafer Co., Erie, Pa., manufacturer of tapping machinery and die heads.

Russell G. Caldwell, for some time sales manager of the Central department of the General Fireproofing Co., Youngstown, O., has been transferred to the company's Washington office. He will assume his new duties late this month.

J. P. Daly has been appointed traffic manager of the Donner Steel Co., with an office in the Buffalo plant. Mr. Daly was formerly chief clerk to E. H. Crowley, assistant general freight agent of the New York Central lines at Buffalo.

Frank W. Richardson has been placed in charge of the office established at 39 Cortlandt street, New York, by the Nagle Corliss Engine Works, Erie, Pa. This company builds air compressors, vacuum pumps and corliss engines.

Col. H. P. Bope, vice president and general manager of the sales department of the Carnegie Steel Co., addressed the Salesmenship Club of Pittsburgh at its meeting in the auditorium of the Chamber of Commerce building last Friday evening, Nov. 23.

John P. Elton, treasurer of the American Brass Co., Waterbury, Conn., and R. G. S. Piggott, consulting engineer of the Bridgeport Brass Co. and the Remington Arms Co., both of Bridgeport, Conn., have been appointed members of the Connecticut state fuel conservation committee.

J. Frater Taylor has announced his intention to retire from the presidency of the Algoma Steel Corp., Sault Ste. Marie, Ont., on Jan. 1. Mr. Taylor, who may be succeeded by Vice President W. C. Franz, will continue to act in an advisory capacity as chairman of the Lake Superior Corp.

C. Price-Green has been appointed industrial commissioner of the Canadian Northern railroad, with headquarters at Toronto. His duties include the location of industries and the development of national resources along the company's lines. He joined the staff of the railway in 1906.

W. J. Schlacks, general manager of McCord & Co., Chicago, has been elected director and vice president of the company, with headquarters in Chicago. Howard D. Taylor of the Remington Arms Co., of Eddystone, Pa., also has been elected vice president of this company.

Edson S. Harris has resigned as Philadelphia district sales manager of the Midvale Steel & Ordnance Co. to accept the presidency of the Philadelphia Steel Products Co., Widener building, Philadelphia. This company, among other activities, will represent

the Wellman-Seaver-Morgan Co., Cleveland, in the Philadelphia district.

Frank H. Brooks has resigned as president and director of E. & T. Fairbanks & Co., St. Johnsbury, Vt., manufacturers of scales. P. C. Brooks, who recently came from Toronto to become general manager, has been made a director, and Henry J. Fuller, New York, has been appointed president.

Dan Lewis, who was formerly in the employ of the Seaman-Sleeth Co., Pittsburgh, but who later accepted a position as salesman for the Standard Engineering Co., Ellwood City, Pa., has returned to the Seaman-Sleeth Co., taken over recently by the Pittsburgh Rolls Corp.

Charles A. Morss, Boston, who recently was elected governor of the federal reserve bank of district No. 1, Nov. 22, is treasurer and director of the Simplex Wire & Cable Co., the Simplex Electric Heating Co. and the Morss & Whyte Co., all of Boston. He is also a class B director of the bank. His new duties will require all his time. He was one of the receivers of the Pope Mfg. Co., four years ago, with Col. George Pope.

Roy M. Welch has been named assistant to President Campbell, of the Youngstown Sheet & Tube Co., Youngstown, O. He has been with that corporation since 1902, coming at that time from the Carnegie Steel Co. When he first came to the Youngstown Sheet & Tube Co., he was in the store and purchasing departments; later was secretary to Vice President C. S. Robinson, and about two years ago was named special agent.

Rear Admiral Frederick R. Harris, chief of the naval bureau yards and docks, has been appointed general manager of the Emergency Fleet corporation, to succeed Rear Admiral Capps. He will co-operate with Charles A. Piez, recently selected as vice president, who will be in actual charge of construction. Rear Admiral Harris was graduated from the Stevens Institute of Technology in 1896 and was made a lieutenant commander in the navy corps of civil engineers in 1903. Since that time he has figured prominently in many of the navy's largest shipbuilding projects.

Roy D. Chapin, president of the Hudson Motor Car Co, Detroit, has been appointed chairman of the new highways transport committee by the council of national defense. Other members of the board are: Logan Waller Page, director of the office of public roads, department of agriculture; Henry G. Shirley, chief engineer of the Maryland state roads commission; and George H. Pride, president of the Heavy Haulage Co., New York. R. C. Hargreaves, who has been engaged in similar work under the council's storage committee, is secretary. This committee will have duties similar to those of the inland waterways committee.

Major Benedict Crowell, Cleveland, who recently was appointed assistant secretary of war, is a well known figure in iron ore circles of the Great Lakes. For a number of years he had been associated with the industry in the official capacity of chemist, taking up this work with the Otis Steel Co., Cleveland, upon graduating from Yale in 1891. Following his connection with this company, he became engaged in business for himself as a chemist and also took up mining engineering in connection with his other work. As a member of the firm of Crowell & Murray, Cleveland, he has done a great deal of ore analysis work during late years. He, with Mr. Murray, is joint author of "The Iron Ores of the Great Lakes". In addition to his work with Secretary Baker, he will co-operate with General Crozier, chief of the ordnance bureau in the work of concentrating American manufacturing industries upon the production of artillery of all descriptions.

Purchasing Agents Elect Officers

At the recent monthly meeting of the Purchasing Agents' association of Pittsburgh the following list of officers and directors were elected:

President, G. D. Leopold, Edgewater Steel Co.; first vice president, C. T. Stewart, Harbison-Walker Refractories Co.; second vice president, D. E. Ferguson, H. K. Porter Co.; secretary, H. E. Harmon, Pittsburgh-Des Moines Steel Co.; and treasurer, C. W. Forcier, Mackintosh-Hemphill Co.; directors for two years: W. A. Kober, H. J. Heinz Co.; E. H. Vockrodt, Frick & Lindsay Co.; F. C. Bortz, Bessemer Coal & Coke Co.; J. E. Stauffer, A. M. Byers Co.; and A. Davia, Dravo Contracting Co.; directors for one year: Robert McMillam, Pittsburgh Steel Co.; W. E. Motherall, Standard Seamless Tube Co.; David N. Glass, Booth & Flinn; C. W. Lepper, Pittsburgh Railways Co.; and W. A. Forrester, Westinghouse Airbrake Co.; directors of National association: Robert F. Blair, Pittsburgh Gage & Supply Co.; E. H. Ridgeway, Colonial Steel Co.

Starts Shipyard

Tennessee Company Begins Construction on Huge Plant Near Mobile

Work will begin at once on extensive shipyards to be constructed by the Tennessee Coal, Iron & Railroad Co. on property recently purchased near Mobile, Ala. George G. Crawford, president of the Tennessee company, who also will be president of the new shipbuilding company, has made official announcement of the plans for the new yard. President Crawford says:

"Ten shipways will be laid down and wharves of suitable capacity for fitting out the ships will be built. A large power plant, boiler shop, plate and angle shop, machine shop, steel metal shop, joiner shop, forge shop, store house and main office will be constructed.

"Two large villages have been laid out, one for white and the other for colored workmen. Both villages will have paved main streets and sidewalks, storm and sanitary sewers, a pure water supply and street railway and electric light service. About 1600 houses of attractive appearance will be completed during the next 12 months.

"The construction of the plant will be done by the Chickasaw Shipbuilding Co. The board of directors will be as follows: E. H. Gary, J. A. Farrell, George G. Crawford, H. C. Ryding and L. T. Beecher. Officers will be: President, George G. Crawford; vice president, H. C. Ryding; general superintendent, J. F. Coleman; secretary-treasurer, L. T. Beecher; auditor, F. B. Winslow; traffic manager, A. W. Carey; purchasing agent, George H. Gray; superintendent of the health department, Lloyd Noland; superintendent of the roads and building department, J. M. Joy; superintendent of the central labor bureau, J. F. Vance.

"For the purpose of supplying steel plates and shapes suitable for building ships, the following construction is now under way at Fairfield, Ala., works: A 40-inch blooming mill, a 110-inch plate mill, a 26-inch shape mill and 600 houses for employes. In addition there will be constructed at Fairfield the following plants for the manufacture of parts and machinery for ships: A plate and angle shop, a forge shop, a foundry, a machine shop and 400 houses for employes. To secure additional steel capacity a third converter will be added to the converting mill at Ensley works and an additional open-hearth furnace will be added of larger size than the existing furnaces."

Expect War Machine to be Rebuilt

Willard's Appointment as Chairman of War Industries Board Probably Will Bring About Needed Centralization of Authority in Few Hands—Creation of Ministries of Air and Munitions Among Early Possibilities

WASHINGTON, Nov. 27.—Daniel Willard's ability as an organizer, recognized in his upbuilding of the Baltimore & Ohio railroad, is expected to work wonders in the war industries board and to give the United States the real war machine it needs. As chairman of the board, to which he was appointed last week, he has no authority; but the position of leadership gives him all the room he needs to point out the defects of the board and to urge the changes necessary.

Mr. Willard's retention of the chairmanship of the advisory commission of the council of national defense, of which the war industries board is a part, gives him the double opportunity to gear the war machine into one of the finest of business organizations. His close relations with the President and his demonstrated ability should give him all the influence he needs to get congress to supply the authority the war board requires.

It would not be surprising to find the next congress creating a ministry of munitions for the cabinet, possibly even establishing a ministry of air, another cabinet position. The dissatisfaction expressed everywhere with the war industries board as it is at present operated demonstrates the need of centralized authority in the board. There are too many heads, too many methods of operation in the organization now. Men high up in the board long since have recognized this and they undoubtedly will support Mr. Willard in revamping the entire department.

But mere creation of cabinet portfolios will not reorganize the war board. Reorganization must come from within. Laws already have been passed and are in operation which would control certain functions of the war board if properly centralized but are distributed among other established departments. The war board is struggling along with purely advisory powers trying to do what requires definite authority. This is making an impossible situation in one of the most important government departments.

The accompanying chart shows the relation of the war industries board to the various dependent—in many cases independent—bureaus. It also shows the channels of communication leading through the clearance committee. This committee meets daily and "clears" the immediate needs of the bureaus. The principle involved is almost essential to the smooth working of the plan, but the policies of the various branches, of the leaders and of the board itself, because of the lack of integrated control, makes for great confusion.

Before Mr. Willard was appointed as chairman the board had under consideration the establishment of a bureau of manufacturing research. He is now considering the personnel of such a board which may be expected to be announced shortly. The board will classify industries as to their importance in contributing to the prosecution of the war. This new

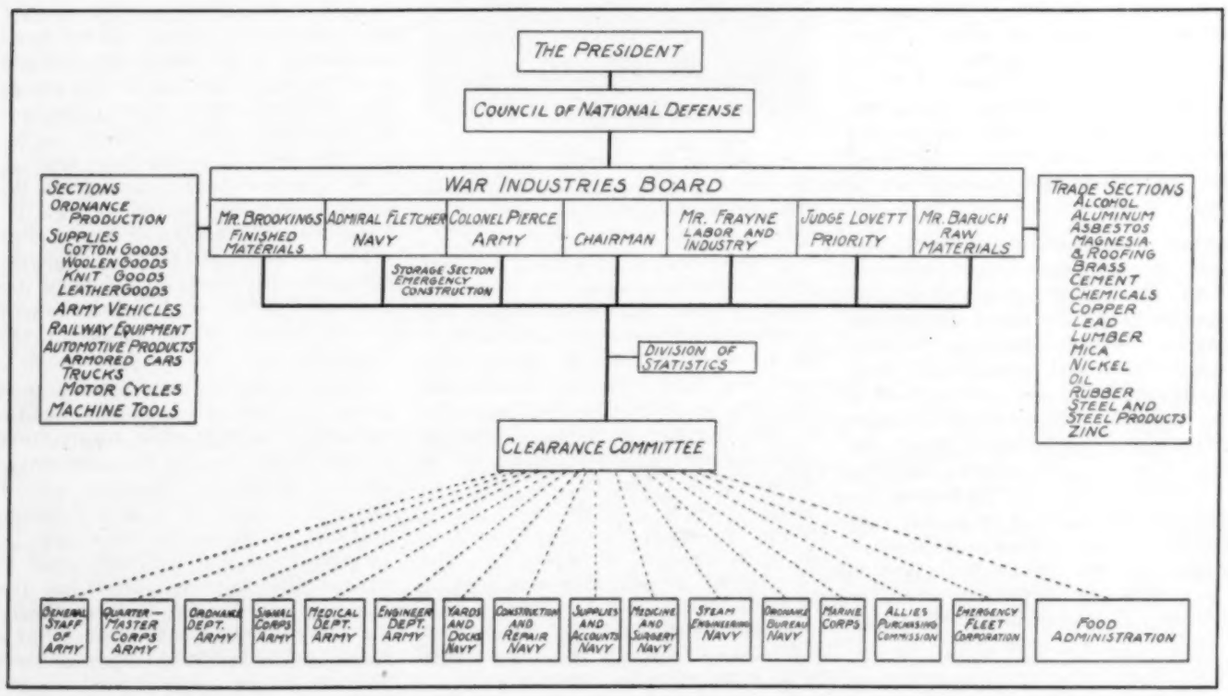


CHART SHOWING ORGANIZATION OF GOVERNMENT'S WAR MANAGEMENT

The clearance committee of the war industries board consists of representatives of the several war purchasing agencies of the government. As individuals they represent their departments. Collectively they act for the board in passing on questions involved in securing war materials in which there are shortages. The clearance committee is a medium through which the several agencies may easily and quickly communicate with the war industries board and with each other. Through the committee communications or presentations are made from the departments to the war industries board and communications or recommendations from the board to the departments. The arrangement does not contemplate that all communications from departments shall be passed upon by the clearance committee, but rather that the several members of the committee, being familiar with the functions of the war industries board and its sections, can intelligently direct any communication to its proper destination

bureau is likely to add to the confusion. It is important. No one doubts that. But adding important bureaus to those already poorly coordinated is only going to make the whole operation more difficult.

Dissatisfaction with the way the government's war requirements are handled is being expressed freely. Every day sees new visitors, including manufacturers of steel, coming to Washington to find out what the trouble is in some particular case. They are shifted from one office to another and from one official to another; the confusion becomes greater and in the end the situation is worse. Many of the men conducting the work of the board attempt to assume authority, but when the time comes for the actual administration of it, pass the tasks on to others. This is not the fault of the men themselves, but the system under which they are forced to labor. There are many who would quit if their patriotism would not be questioned.

Fuel Administrator Warns Coke Makers

WASHINGTON, Nov. 27.—Coke producers selling 72-hour selected foundry coke to blast furnaces at $7 have been warned by Fuel Administrator Garfield that they are subject to the penalties of the Lever act which provides for $5000 fine and two years imprisonment. This warning was given in an announcement which established the prices on by-product coke manufactured in New England.

In announcing these prices, the administration said:

"For coke produced in New England the maximum price for each grade f.o.b. cars at point of production shall be the base price for the grade of coke plus the freight rate from the competing beehive coke district which takes the lowest freight rate to the point where the coke is produced, and plus 7 cents for each advance of 5 cents above 60 cents in freight charges per long ton of coal for water transportation on the coal used in the manufacture of such coke."

Confusion Over Beehive Prices

Based prices established on by-product coke a week ago were as follows: Run of ovens, $6; selected foundry, $7; and crushed over 1 inch in size, $6.50. In announcing these base prices, some confusion arose in comparison with the base prices on beehive coke. On this kind the prices are: Blast furnace, $6 foundry, 72-hour selected, $7; and crushed coke, $7.30.

The object of the difference in the two sets of base prices being only on crushed coke is to encourage greater consumption of the by-product grade. But in figuring the purchase price on by-product coke the freight rate between beehive and by-product districts must be added. For example: A consumer in Moline, Ill., may buy beehive coke in Connellsville at $6, $7 or $7.30, f.o.b., but in buying by-product coke in Chicago he must pay $6, $7 or $6.50, f.o.b., plus the freight rate from Connellsville to Chicago.

The announcement of the fuel administration also said:

"Reports have reached the administration that coke producers in some instances are selling '72-hour' coke to blast furnaces and are taking advantage of the $1 differential allowed on 72-hour selected foundry coke. Any person guilty of asking, demanding or receiving higher prices than are allowed under the fuel price regulations shall, upon conviction, be fined not more than $5000 or be imprisoned more than two years or both."

Postpones Meeting

The fourteenth annual convention of the National Rivers and Harbors congress, which was scheduled to meet in Washington Dec. 5, 6 and 7, has been temporarily postponed, owing to the present crowded conditions of the hotels in that city.

Obituaries

William W. Dandy, secretary of the Chalmers & Williams Mining Machinery Co., 72 West Adams street, Chicago, died Nov. 22, in his office, aged 68 years.

James L. Perry, founder of the Berlin Machine Works, of Beloit, Wis., died recently in Chicago, aged 82 years. He was a veteran of the civil war. For three years past he had made his home in Chicago.

Emery H. Diehl, assistant manager of the United Alloy Steel Corp., Canton, O., died recently, aged 33 years. Mr. Diehl, prior to his association with the Canton company, was connected with the Carnegie Steel Co., Pittsburgh.

Henry R. Ford, a member of the mechanical engineering firm of McCarthy Bros. & Ford, Buffalo, died recently at his home in that city, aged 46 years. He was a member of the American Society of Mechanical Engineers and the American Institute of Electrical Engineers.

Grant Barney Schley, head of the famous brokerage firm of Moore & Schley, whose impending failure in 1907 was averted by the taking over by the United States Steel Corp. of the Tennessee Coal, Iron & Railroad Co., died Nov. 22 at his home in Far Hills, N. J. Mr. Schley was 73 years of age and had been a member of the New York stock exchange since 1881. He was director of the American Smelting & Refining Co., Chihuahua Mining Co., Electric Storage Battery Co., the Northern Pacific railroad, the Pittsburgh Coal Co., and the Republic Iron & Steel Co.

Frederick W. Cole, consulting engineer and expert of the Gamewell Fire Alarm & Telegraph Co., Newton Upper Falls, Mass., died recently at his home in Newton Highlands, Mass., aged 60 years. He was inventor of many devices connected with fire alarm systems and had been associated with the company for 40 years.

Lyman B. Jewell, chairman of the board of directors of the Jewell Belting Co., Hartford, Conn., and for many years its president until last August, died recently, aged 90 years. He was succeeded as president by Charles E. Newton, who died Nov. 15. Mr. Jewell has been connected with the company since 1873.

Albert P. Bowe, formerly advertising manager of the Hydraulic Pressed Steel Co., Cleveland, was accidently killed by a rifle shot recently while at practice on the rifle range at Camp Perry, O. He was a sergeant at the time of his death. Mr. Bowe previous to his connection with the Hydraulic company, was associated with the Penton Publishing Co.

Gardner L. Holt, founder and president of the G. L. Holt Mfg. Co., Hartford, Conn., died at his home in that city, Nov. 22, aged 80 years. He devoted his entire life to mechanical training, having worked at the Springfield, Mass., arsenal; the Smith & Wesson Co., in the same city, and for the Pratt & Whitney Co., Hartford, Conn. He had been manager for several years of the Chicago office of the Pratt & Whitnew Co., when 18 year ago he founded the G. L. Holt Mfg. Co.

No Cessation Says Labor

Federation Claims Right to Organize as Requisite to Solution of All Wage Problems—Statement of Principles Adopted at Buffalo

The American Federation of Labor by a unanimous vote at its closing session in Buffalo adopted a statement of the conditions and principles that must be applied to industrial problems arising from the war, so far as labor is concerned. Generally speaking they are in line with the understanding reached between President Wilson and President Gompers, although there are some points hitherto doubtful that are clearly emphasized.

The right to organize is claimed as essential to the solution of all problems arising between employer and labor, and equal representation will be demanded with the employer on all wage boards or commissions.

As to Strikes

The declaration does not say that there shall be no strikes. "It is advisable," the final paragraph says, "that production should not cease because of an apparent injustice or oversight contained in an award, for it is necessary to the nation's protection, as well as to the welfare of the trades-union movement that there should be no cessation of work, except as a last resort."

As to wage conditions, the statement reads:

"In determining what the wage rates should be there are several vital factors to be considered, apart from the increased cost of living.

"The existing wage rate in an establishment should first be considered as to its equity:

"Was it established as a result of a joint conference and agreement between the employer and his employes or was it established as a result of the employer's individual conception of what wages should be paid to those in his employ?

Comparison of Rate

"To what degree did the previous wage rate compare with those in establishments in the same districts where wages have been established through joint agreement between employer and employes?

"How did the wage rate adopted through joint agreement in the district compare with the wage rates in other districts where joint wage agreements existed?"

Whenever the employes in a department or an establishment have a common complaint or grievance the statement says, it is fundamental that the employer should meet those who may be selected by the workers to represent them.

The statement was submitted to the convention by the resolutions committee and was adopted unanimously.

The federation reaffirmed its position against government by injunction and declared that any injunction dealing with the relationship of employer and employe based on the dictum that labor is property "be held and treated as usurpation and disregarded let the consequences be what they may."

The declaration was adopted by the convention in connection with a resolution relating to a supreme court decision of the state of Washington, enjoining strikers from picketing. The resolution asked the convention to condemn the reactionary attitude of the court and to give its best counsel and effort to the affected workers.

A resolution was passed condemning Postmaster Burleson for what is alleged to be autocratic methods toward labor. This was in reference to the working conditions of postal employes.

To Fight Steel Industry

The resolution calling for the United States Steel Corp. and the National Erectors' association and the Bethlehem Steel Corp. to correct working conditions in their mills was passed by the convention. Adoption of the resolution was taken to mean that the federation will make a vigorous fight to unionize all branches of the steel industry which have held out against it so long.

"Organization of steelworkers is made difficult because of their cosmopolitan makeup," said Delegate Williams of the Amalgamated Iron, Steel and Tin Workers. "Let us bring the steel barons to realize that the workman is human and entitled to decent treatment. We can best bring this about by compelling them to recognize the Federation of Labor."

The convention voted 244 to 20 in favor of conscription.

Director Gifford of the council of national defense had a conference with President Gompers in regard to the distribution of labor to those industries on which the United States government is depending. Gompers believes that some method can be devised to divert skilled labor from places where there is only part-time employment, and send them to plants where there is steady work.

V. Everett Macy, chairman of the adjustment board of the committee on home defense, held a conference with labor leaders regarding differences between shipping interests and the metal trade workers on the Pacific coast and the way is said to have been paved for a settlement of the matter. John Hill and Arthur Hayday, British delegates to the labor convention, are to go to the coast in the same interest.

The metal trades department of the federation now is conducting a three-day convention.

The re-election of Samuel M. Gompers to the presidency of the federation is taken to mean that the members have reaffirmed their confidence in his war stand, and acts as a ratification and confirmation of the favorable conscription vote.

Distributes Bonuses

At a banquet of more than 700 of its employes, the General Fireproofing Co., Youngstown, O., recently distributed $19,000 in bonuses. These bonuses were based on regularity of attendance at work, and covered a 6-month period, ending Oct. 1. Five hundred and thirty of those present participated in the distribution, and of this number 174 made perfect records. In making the distribution, General Manager S. S. French stated that it cost the company about $70 for an employe to leave and be replaced. This cost results from lost production, damaged product and machinery and reduced efficiency. To avoid this loss by inducing employes to remain at work, the company, he said, instituted this bonus plan.

Labor Notes

About 250 employes of the iron foundries in Lowell, Mass., have struck for an advance of 50 cents a day. Their minimum pay has been $4 a day.

Seventy-five adjusters of the Royal Typewriter Co., Hartford, Conn., walked out Nov. 22, because of the refusal of the company to grant a general increase in wages of 10 per cent, both for day and piece work.

Adjustment of the strike of molders in shops at Bradford, Pa., was effected recently. The employes were given an advance of 25 cents a day, which becomes immediately effective, and 50 cents a day after Jan. 1. The men were receiving $4.50 for nine hours and asked for $5.

Many Furnaces

Shown to Have Been Forced to Bank —Reports Falling Off

Pittsburgh, Nov. 27.—Out of a total of 235 blast furnaces which reported to the committee on lake coal and ore transportation for the week ended Nov. 17, 23 were banked. Fourteen of these were Steel Corporation furnaces and the remaining nine were independent stacks. Six of the Corporation furnaces were banked for repairs, relining, etc., and eight were banked for lack of coke. Five of the independent furnaces were shut down for repairs, relining, etc., and four for lack of coke. These 23 furnaces represent a weekly capacity of 57,833 tons or an annual capacity of 3,700,316 tons.

The number of furnaces reporting for the week referred to is the lowest recorded since this committee was organized. Despite the zealous efforts that its members have made to obtain full data from all of the 410 furnaces listed, interest among the furnaces appears to be decreasing rather than increasing. The work was taken up for the benefit of both the government and the furnaces themselves in an effort to ascertain raw material needs of operators so that transportation conditions, as far as possible, could be adjusted accordingly.

The greatest shortage of material for any individual territory was in the Pittsburgh district, where there was an insufficiency of 27,690 tons of coke. In the Chicago district there was a shortage of 20,000 tons of coal and 15,000 tons of coke. The Mahoning valley district reported a shortage of 5000 tons of coke and 15,000 tons of coal.

Sell Historic Foundry and Machine Shop

Founded in 1837, a foundry and machine shop in Brownsville, Pa., has been sold by J. Herbertson's Sons to Ira E. Stevens and William P. Walker, Pittsburgh, who will take over the property Dec. 15. This concern, the oldest in Brownsville, was established by John Herbertson, a molder, who came to New York from Scotland 100 years ago. After working at his trade in Marietta, O., Mr. Herbertson returned to Pittsburgh and subsequently was employed in the foundry of John Snowden, of Brownsville. Mr. Snowden was given the contract to build an iron bridge across Dunlap's creek, connecting Brownsville and Bridgeport, now South Brownsville, and John Herbertson was charged with the designing and construction of this bridge. This bridge is said to have been the first one erected by the government in America.

Mr. Herbertson started into business for himself in 1837 in Brownsville. In 1850 the Herbertson engines were installed in many of the steamboats on the Monongahela, Ohio and Mississippi rivers. During the succeeding years mining machinery and pit cars were made with great success and more recently the old foundry has been engaged extensively on automobile repair work. When John Herbertson's sons, William and George, grew to manhood, their father took them into business with him and the firm became J. M. Herbertson's Sons, and following the death of George Herbertson several years ago, the latter's son, James R., took his father's place.

Aluminum Jumps

Value of Production in 1916 Increased by 108 Per Cent

With a total of $33,900,000, the value of primary aluminum produced in 1916 increased 108 per cent. This increase in value, although due in part to increased prices, was brought about mainly by the heavy gain in production. The value of aluminum consumed during that year made a still greater gain, the total being $43,698,936, or an increase of nearly 117 per cent over the preceding year.

According to figures furnished the geological survey by the *Engineering and Mining Journal*, prices on virgin material ranged from a low of 55 cents in January to a high of 65.12 cents in November, the average for the year being 60.71 cents, as compared with 33.98 cents in 1915. The production of aluminum is not given, but an estimate of plant capacity is made by the survey, giving 87,500 short tons for both the United States and Canada. Exports jumped in value from $3,682,117 in 1915 to $15,417,134 in 1916. Imports, however, continued to decline in value, incoming metal aggregating $1,785,870, as against $1,808,193.

Production of bauxite increased 43 per cent, the output being 425,100 long tons. Of this amount producers of aluminum consumed about 300,000 tons, makers of chemicals about 80,000 tons, and makers of abrasives and refractories about 45,000 tons. The increase in value was approximately 52 per cent over the preceding year, the ore being worth at the mines $2,296,400. The prices received for bauxite during that year ranged from a low of $4.25 to a high of $6.25 a long ton, the average price for the whole production being $5.40.

War Contracts

Continue to Flow in Upon Detroit Forcing Industrial Readjustment

Detroit Nov. 24.—Detroit now is passing through a period of readjustment of its industries to war business according to A. A. Templeton, of the Detroit Seamless Steel Tube Co. and president of the board of commerce. This condition, Mr. Templeton says, has resulted in a slackening of production and nonemployment of a certain percentage of labor but will be passed by the first of the new year. At that time it is expected mills and factories will be pressed to top speed to produce war materials for which the government departmental heads are clamoring and which Detroit can supply without great equipment rearrangement in plants. It is expected that the new war materials plants being erected for Dodge Brothers, the Lincoln Motor Co., Fisher Body Co., Packard Motor Car Co. and other enterprises will be in working order by Feb. 1.

R. H. Collins, general manager of the Cadillac Motor Car Co., of the General Motors group, has announced that the company has taken its second large war contract for aircraft engines and munitions. The contract involves more than $25,000,000 worth of materials and a large portion of the plant is being given over to this work.

It is now estimated that industrial Detroit will be working on government contracts involving more than $400,000,000 before the end of the year. New contracts are being let daily through a strong representation at Washington maintained by private organizations, the National Automobile Chamber of Commerce and the Detroit Board of Commerce. The board of commerce is working out a plan to bring large contracts here by dividing the work among small factories.

The Edmunds & Jones Corp. has closed a contract for 30,000 sets of army motor truck lamps.

Smith,. Hinchman & Grylls, engineers, are letting contracts for the completion of the new buildings for Dodge Brothers, in which will be manufactured gun carriage parts and other war materials. The buildings will cost $1,500,000. One unit will be 572 by 513 feet.

Contract for the erection of an aeroplane engine assembly building has been let by the Packard Motor Car Co. to Bryant & Detwiler.

H. C. Cornelius has obtained a $400,000 contract for brass aeroplane parts from the government to be manufactured by the Wolverine Brass Works, Grand Rapids.

Iron and Steel Financial News

Up-to-the-Minute Fact and Comment Collected and Sifted For Busy Readers

Financial Circles Regain Equilibrium

STOCK movements of the past few weeks have shown how completely the financial markets now are dominated by the war and its developments. In the recent investors' panic—we can call it panic now that the condition has passed—which brought Steel common crashing down through par and still lower to below 90, no one was thinking of corporate assets, or industrial earnings, or of the real values which lay behind the country's representative securities. The market already was undergoing a readjustment of values to meet war conditions, as reflected in fixed prices and heavier taxation. Then came the news of Russia's collapse, followed shortly by the retreat of Cadorna's broken armies to the line of the Piave. Security holders worked themselves into a demoralized frame of mind and the liquidation of stocks ran its full length unchecked. Then the market found its equilibrium in the course of time and awaited a new impulse. This was provided in course of time by the brilliant assault by the British forces on the Hindenburg line about Cambrai. The response of the stock market was immediate and emphatic. The steel stocks in particular, which had been among the heaviest sufferers in the prolonged market slump, came back sharply. United States Steel common advanced 5 points in the week ending Nov. 26; Lackawanna Steel common, 7¾; Republic Iron & Steel common, 8½; Bethlehem B, 2½; Gulf States Steel, 5½; Midvale, 1½.

Dependent upon the fortunes of war as our stock market and all our other institutions are, a truer perspective has developed, replacing the sub-conscious fear, not expressed but nevertheless in evidence, that perhaps after all it would be impossible to accomplish a complete victory over autocracy that democracy hopes for. In this frame of mind, the stock market had discounted everything save our defeat or a drawn peace. But by last week's rising tendency, the financial markets have recorded a vote of confidence in the country's future through the wholesale purchase of representative securities. Considerable buying was done by the outside public, for cash, who saw the opportunities presented by the many bargains. Here are some of the values which were presented by the stock market on Nov. 24, regarded from the standpoint of dividend yield: Bethlehem B 12.04; Crucible Steel preferred, 8.05; Gulf States Steel, 11.05; Lackawanna Steel, 7.36; Midvale Steel, 13.37; Republic Iron & Steel, 7.64; United States Steel, 5.10.

Now that fixing of prices is becoming an old story in the iron and steel trade, steel company managements can make shrewd gueses at what their 1918 earnings may be, provided labor and transportation troubles do not increase. But the proportion of these earnings which they may retain or distribute among stockholders continues an unknown factor. The question as to what invested capital is remains unanswered. An advisory board has been named at Washington to assist the commissioner of internal revenue to pass upon the proper interpretation of the term invested capital. It is expected that an exhaustive set of regulations will be released by the commissioner of internal revenue in a short time, setting forth in detail rulings to be followed in determining taxes due under the war revenue act. The complexity of the act and the inconsistencies and injustices to certain classes of tax payers as now provided is finding reflection in a growing feeling of criticism and disapproval. Unquestionably, one of the first things that congress should do, after it convenes Dec. 3, would be to modify radically some sections of this act.

Curtiss Airplane Plans for Huge Business Volume

Beginning Jan. 1, the Curtiss Airplane & Motor Corp., Buffalo, will begin turning out $9,000,000 worth of airplanes and airplane parts a month. Plants already in operation will take care of $4,000,000 worth of this business; the plant, which was to have been finished Nov. 15, and will be completed within a short time of the contract period, will take care of $5,000,000 worth of this business. By the close of next year it is reliably stated, that the Curtiss plant will be turning out the unprecedented figure of $20,000,000 worth of planes and parts a month, or at the rate of $240,000,000 a year. Continuance of the war through all of next year would probably mean a $150,000,000 1918 business. For the six months to end June 30, the total of business should be between $50,000,000 and $60,000,000. The new plant of the corporation covers a tract of 72 acres. The buildings and auxiliaries cover approximately an area of 1,400,000 square feet. The cost of the new plant will be within 5 per cent of estimates, it is said.

Airplane men believe that the next government appropriation for airplanes will be $1,000,000,000, or possibly $1,500,000,000. The present aviation bill calls for an appropriation of $640,000,000, of which probably not more than $250,000,000 is being expended on airplanes and parts. The huge remainder goes into purposes of training. Next year probably will see the sum of $650,000,000 actually spent on flying equipment, or practically three times the present sum. Large orders for flying boats, the craft with which Curtiss has had great success, now are filling the Buffalo plant.

New Southern Ferroalloy Plant is Started

Operation of the new plant of the Southern Ferro Alloys Co., Chattanooga, Tenn., has just been begun, according to an official announcement. The company was organized in April with $210,000 capital to manufacture electrolytic 50 per cent ferrosilicon. It is the plan, however, also to manufacture later ferrochrome and ferromolybdenum. The Canada Carbide Sales Co., 30 Church street, New York

City, has been appointed exclusive sales agent for the company. The president of the company is P. J. Kruesi. Among other officers are Eugene P. Clark, N. Thayer Montague, G. L. Davidson and Theodore L. Montague. With the exception of Mr. Clark, who is from Chicago, and Mr. Davidson, from Michigan, all the offiecrs are Chattanoogans.

Financial Crop Ends

W. A. Vigiers Iron Works, Astoria, Ore., has changed its name to the Astoria Marine Iron Works and will remove its plant to the port dock.

* * *

The P. & B. Mfg. Co., Milwaukee, Wis., manufacturer of electric devices, has changed its name to the A. H. Peterson Mfg. Co., and shortly will increase its capacity.

* * *

President E. A. S. Clarke, of the Lackawanna Steel Co., has announced that out of the total of 11,170 employes of the company and subsidiaries, 8909 subscribed to the last loan. The employes bought $696,000 worth of bonds.

* * *

The Greenfield Tap & Die Corp., Greenfield, Mass., has absorbed the Bickford Machine Co., of that town, and will operate it as a division of the corporation. George A. Markle, president, and O. S. Bickford, treasurer of the company, will continue the management of the plant. Mr. Bickford established the business about 10 years ago.

* * *

The United States Finishing Co., Norwich, Conn., a munitions plant, at the annual meeting of the stockholders recently elected the following directors: Edward A. Greene, Passaic, N. J.; Herbert T. Howell, New York; Andrew C. Imbie, New York; Francis J. Leavens, Norwich, Conn.; Jesse A. Metcalf, Providence, R. I.; George S. Munford, Boston; Joseph S. Proskauer, New York; Henry B. Thompson, Greenville, Del., and Herbert J. Wells, Providence, R. I.

* * *

"Utility Letters of Credit in the Export Trade—a Plea for Standard Forms" is the title of a new pamphlet issued by the American Steel Export Co., Woolworth building, New York. J. P. Beal, the author, who is secretary and assistant treasurer of the American Steel Export Co., indicates in this pamphlet points of weakness which are worthy of immediate attention by American banks and exporters for the betterment of our entire overseas financial facilities.

* * *

The Blevney Machine Co., recently incorporated to take over the patent, good will and plant of John C. Blevney, Newark, N. J., inventor of polishing machinery, has purchased the factory of the Keystone Stoker Co., on Wells street, Greenfield, Mass., and will locate there. W. S. Howe, president and treasurer of the company, states that he expects to have the new plant in operation early in January. The factory will be extended 20 feet to the east and an addition is likely to be built on the north side.

* * *

A controlling interest in the Central Foundry Co., Webb City, Mo., has been acquired by H. T. Hornsby, who for 14 years was vice president and general manager of the United Iron Works Co., Springfield, Mo. Mr. Hornsby lately sold his interest in the latter company. Associated with Mr. Hornsby is J. A. Desbonne, who formerly was local manager of the United Iron Works Co., Pittsburg, Kans. The Central Foundry Co., as heretofore, will specialize in the production of semisteel chilled parts for zinc-ore grinding and crushing mills.

* * *

Organization of the Youngstown Pressed Steel Co., Youngstown, O., recently incorporated with $1,000,000, has been completed by the election of the following officers: President, W. W. Galbreath; vice president, W. G. Kranz; secretary-treasurer, J. Reed Evans. The company recently purchased the fabricating departments of the Sharon Steel Hoop Co., Sharon, Pa., and the Youngstown Iron & Steel Co., Youngstown, O., and plans to start soon on the erection of a plant for the manufacture of metal products, particularly fireproofing material.

* * *

The following officers of the Crucible Steel Co. of America, Pittsburgh, were re-elected at the organization meeting of the board of directors: Herbert DuPuy, chairman of the board; O. H. Wharton, president; H. A. Brown, J. W. Dougherty, George W. Sargeant, John A. Sutton and George A. Turville, vice presidents; George A. Turville, secretary and treasurer; A. A. H. Niebaum, J. M. McComb and H. F. Kress, assistant treasurers; H. F. Kress and E. W. Reed, assistant secretaries; N. W. Nolen, comptroller. G. R. M. King, auditor; H. L. Gellinger, assistant auditor.

Blaw-Knox Salesmen Meet at Pittsburgh

Salesmen of the Blaw-Knox Co., Pittsburgh, steel fabricator and manufacturer of furnace equipment, held their annual convention at Pittsburgh, Nov. 22, 23 and 24. The first day was devoted to an inspection of the company's Blaw plant at Hoboken, Pa., where clamshell buckets, steel forms for concrete construction and other steel products are manufactured. On the following day a special train conveyed the group to the company's Knox plant, Wheatland, Pa., where L. L. Knox, inventor of water-cooled equipment for furnaces, gave a series of talks on water-cooled doors, ports, etc. The convention closed on the evening of the third day with the annual banquet, which was attended by 110 members of the sales staff.

Production Cut

In Coke By-Products by Coal and Car Shortages

New York, Nov. 24.—Coal shortages and the railroad embargoes are beginning to have an acute effect upon the coal tar products market. Numerous coke ovens have been forced to curtail their operations to such an extent that they are unable to turn out the by-products which their contracts call for. In many cases where production is available, it cannot be shipped due to railroad embargoes. As a result a scarcity of some of coal tar producers has developed principally in benzol. One producer ran short on contract deliveries to the extent of 85,000 tons, and arrangements had to be made to obtain this quantity from another producer. Since present difficulties are so general, such replacement is not easy. The spot market on pure benzol continues at 45 to 46 cents per gallon. Although inquiry is active, the volume of business, by reason of present conditions, was much smaller this week than in previous weeks. Contract benzol is quoted at 44 to 49 cents per gallon.

The government has commandeered all production of toluol in excess of that required to fill present commitments. The government's policy apparently is to recognize all existing contracts and to permit their fulfillment. In the trade this policy is considered as an exceedingly liberal one. No new contracts may be made or present ones renewed without permission of the government. Fairly large quantities of toluol were shipped this week in accordance with government shipping instructions. This material will be billed to the government at the established price of $1.50 per gallon at producer's plant.

Coke Oven By-Products

Spot

Per Gallon at Producers Plant	
Pure benzol	$0.45 to .46
Toluol	1.70 to 1.80
Solvent naphtha	.17 to .20
Per Pound at Producers Plant.	
Phenol	$0.50
Per 100 Pounds at Seaboard	
Sulphate of ammonia	$4.90 to 5.00

Contract

Per Gallon at Producers Plant	
Pure benzol	$0.44 to .49
Toluol	nominal
Solvent naphtha	.17 to .20
Per Pound at Producers Plant	
Phenol (nominal)	$0.50
Per 100 Pounds at Seaboard	
Sulphate of ammonia	nominal

Destroyer Tool Need is Paramount

Special AA Priority Certificates Soon May Be Given Machine Tools Required for Carrying Out Destroyer Program—New Jersey Shellmaker Inquires for 300 Lathes—Tool Builders Erect Additions

MACHINE tools needed for the destroyer program soon may be granted special AA priority certificates, so pressing is the demand for these machines. At present the destroyer requirements receive A1 priority, together with ordnance and airplane work. The tools needed for the ordnance base depot in France also received this rating, but it is understood that these machines have been about all secured. The requirements of certain railroads and of cargo shipbuilders receive a B1 certificate. Tools needed for work not essential to the conduct of the war presumably would be given a C rating, but not many of these are being built these days. Active requisitioning of tools needed for emergency work proceeds. In most cases the original owner of the tool taken is leaving his order on the builder's books; deliveries accordingly deferred.

Inquires for Shipyard Equipment

The Bayles shipyard, Port Jefferson, L. I., New York, is in the market for equipment for its plate and angle shop, including one bending roll, one straightening roll, one plate planer, four punches and four shears. The Dover Boiler Works, Dover, Del., is in the market for punches and shears. The Aetna Steel Products Co., 30 Church street, New York, is in the market for machines for a boiler shop. Oscar Daniels, engineer, Woolworth building, New York, who has been buying equipment for a shipyard at New Brunswick, Ga., is reported to have closed for some second-hand machinery.

Needs 300 Lathes for Shellmaking

The International Fuse & Arms Corp., Bloomfield, N. J., which has received a government contract for 6-inch shells, is in the market for over 300 26-inch lathes and a number of other tools. Purchases of machine tools for the Watertown and Watervliet arsenals will amount to several million dollars. The Standard Aircraft Corp., which recently was incorporated in Albany, N. Y., with a capital of $5,000,000, has received large government orders and expects to increase its output to 60 planes a week from its two large and seven small plants. The Davis-Bournonville Co., Jersey City, N. J., and the Oxweld Acetylene Co., Newark, N. J., have been buying machine tools. The department of education, of New York, has closed for tools for a vocational school.

Soon to Award Contracts for Three Gigantic Cranes

Some interest has been shown among crane builders concerning the forthcoming award by the navy department of three 350-ton cantilever cranes for the navy yards at New York, Philadelphia and Norfolk. These will be the largest cranes ever built in this country. Figures were submitted by only three bidders, the low bid being approximately $2,400,000 for all three. The Baldwin Locomotive Works has closed for the 24 electric traveling cranes for which it recently inquired. Of the total, eight 20-ton cranes were awarded to the Shepard Electric Crane & Hoist Co., Montour Falls, N. Y., and the remaining 16 large cranes went to the Pawling & Harnischfeger Co., Milwaukee. Included in the award also were two 15-ton electric traveling cranes with 5-ton auxiliary which went to the Shepard Electric Crane & Hoist Co. The William Cramp & Sons Ship & Engine Building Co. has closed for six electric traveling cranes. The Watertown arsenal list of 46 electric cranes was distributed by the Stone & Webster Engineering Corp., Boston, among the Pawling & Harnischfeger Co., the Whiting Foundry & Equipment Co., Harvey, Ill., and the Shaw Electric Crane Co., New York. The Blake & Knowles Works of the Worthington Pump & Machinery Corp., at East Cambridge, Pa., has closed for the 39 small electric cranes for which it recently asked.

Many Plant Additions Are Under Way

The Crucible Steel Co. of America, which recently received a contract for 150,000 6-inch shell forgings for the British government, has authorized the construction of three big buildings at its Harrison, N. J., plant. The Diamond Chain Co., York, Pa., has bought a 5-acre site in that city and will build a plant, including a forge shop, drop forge plant, machine shop and two large buildings to contain automatic machines. The Niles-Bement-Pond Co. has purchased a 50-acre site near Kearney, N. J., and later may construct a plant. The Erie Forge Co., Erie, Pa., which has a government contract for gun forgings, will build additions to cost between $5,000,000 and $10,000,000. Day & Zimmerman, 611 Chestnut street, Philadelphia, are the engineers. The Emergency Fleet corporation has awarded a contract for 20 4000-ton steel ships to the Foundation Co., Woolworth building, New York. These ships are to be built on a plan which is expected to render them unsinkable.

Heavy Tools Are in Great Demand

HEAVY machine tools are being bought in large numbers in the Chicago market. Few small buyers are in the market, as prices generally are beyond their reach, and deliveries, in the absence of priority certificates, are difficult to secure. Even second-hand tools are beyond the reach of ordinary small shop owners. The Four Lakes Ordnance Co., Madison, Wis., has bought a number of gun-boring machines, considerable tool room equipment and a number of universal radial drills. At present this company has an inquiry out for about 15 more machine tools. Boring mills of a special type are being built for this company by the Power & Mining Machinery Co. of Milwaukee. The Standard Steel Car Co. is understood to have taken a large contract for the government and has already bought some additional equipment, including radial drills, shapers, lathes and boring mills. Equipment from the plant of the Smith Form-A-Tractor Co., valued at $100,000, has been sold at auction. The Hotpoint Electric Heating Co. is preparing to build a plant in Chicago to cost $250,000. The Universal Engineering Co. of Chicago will build a machine shop at Maywood, Ill. The Astoria Marine Iron Works, Astoria, Oreg., will build a machine shop and foundry, and the Puget Sound Machinery

That "Knotty Problem"!

It Proved To Be Knottier Than We Suspected!

AN EXPLANATION

This illustration of a piece of AGATHON Chrome Vanadium Steel which was knotted as shown, ***while cold,*** without the slightest injury, originally appeared in our advertisement in the September 20, 1917 issue of this magazine.

At that time, we stated that the bar used was ***1½" round.***

We have since received scores of letters calling our attention to the fact that there was an obvious discrepancy between the size of the bar as we gave it, and the illustration.

As a matter of fact the bar used in this test was only ¾" diameter, not 1½" as previously stated.

In making the illustration everything was reduced 1/16", so that 1 inch actual measure appears as 15/16", while ¾" the actual size of the bar, appears as 11/16".

Just how the error was made is not clear, the only clue being that a bar of steel 1½" diameter was in the laboratory at the time the ¾" bar was being tested.

Why it was not caught before the advertisement appeared is another mystery.

In a way we are glad it happened because it proves that AGATHON ads are not only seen, but are also ***read.***

At the same time we regret that our friends should have been annoyed or perplexed, while heartily thanking all those who displayed their interest by writing us.

Agathon Steels Will Serve Your Purpose Best.

The Central Steel Company
Massillon, Ohio

AGATHON
ALLOY STEELS

Depot, Seattle, is preparing to put up a plant which will cost about $1,000,000. The Skinner & Eddy Shipbuilding Co. will build a foundry, power house, and punch shops at Seattle. The Detroit, Toledo & Ironton railroad has bought 76 acres at Detroit to build a terminal. The C. R. Wilson Foundry & Machine Co. will build a plant at Pontiac, Mich. The Hercules Gas Engine Co., Evansville, Ind., will build a machine shop at once and a foundry addition later. The Northern Boiler & Structural Works, at Appleton, Wis., will build an addition to its machine shop. The Milwaukee Forge & Machine Co., Milwaukee, is preparing to build a forge shop and a machine shop.

Tentative Inquiries Are Numerous

MANY of the inquiries for machine tools that have been received during the past few weeks in the Cleveland market are contingent upon the receipt of government contracts. This apparently large volume of business still pending, the general sold-up condition of the market and the precedence that must be given to priority orders, according to one dealer, are exerting a deterring influence on dealers in general. That unprecedented prices are being paid for machine tools for immediate delivery is indicated in the following case: About 11 months ago an order was placed with a local dealer for several 30-inch planers, with the provision that delivery be made within 10 months. The stipulated price for each planer was $2500, and delivery was made within the required time. Since the company was not engaged in war work, however, it was decided to dispose of the planers at the increased market price, accordingly these tools were sold back to the dealer for $3600 each. The dealer resold the planers for $3800. This is only one of many cases, it is said, where tools have been sold at 150 per cent in excess of their market value of two years ago. The Dodge Bros. Co., Detroit, has closed with the Strong, Carlisle & Hammond Co., Cleveland, for several milling machines and grinders, involving about $50,000. Machine tools still are being bought in the Cleveland district by the Lincoln Motor Co., Detroit. An inquiry lately has been received by the Alliance Machine Co., Alliance, O., for several large lathes. The Port Arthur Shipbuilding Co., Port Arthur, Ont., is in need of a milling machine. About 100 machine tools, part of the assets of the Pullman Motor Car Co., York, Pa., will be sold at auction Dec. 4. The lot includes milling machines, lathes, gear cutters, drill presses and miscellaneous machines.

Government Buying Wanes in Pittsburgh District

DOMESTIC buyers of machine tools are pressing manufacturers for shipments, according to reports of sellers in the Pittsburgh district. Purchasers who are asking that deliveries be made quickly find themselves facing a formidable obstacle in the form of government orders. The latter, of course, are being given precedence and in consequence shipments of domestic requirements have been deferred eight months and longer. Government buying in some lines of machine tool equipment has passed the peak of its activity and has slowed down considerably. This has prompted hope on the part of private buyers that they will be able to obtain more nearly normal service from manufacturers in the not distant future. This turn of affairs indicates that munition plants are well equipped or soon will be.

New Construction and Equipment

Concise and Timely Business Building Opportunities from the Field of Industry

Among New England Factories

OAKLAND, ME.—The American Woolen Co. has awarded the contract for a boiler house to cost $75,000 to the E. W. Pitnam Co., Lawrence, Mass.

BOSTON.—The Gibbons Commercial Body Co. has been incorporated with $100,000 capital. M. F. Fitzgerald, K. A. Finley and William L. F. Gilman are the incorporators.

CAMBRIDGE, MASS. — The Worthington Pump & Machinery Corp. has awarded the contract for a 1-story storage building 42 x 200 feet in size; to cost $35,000, and for a 1-story foundry 81 x 121 feet to cost $48,000, to the Aberthaw Construction Co., 27 School street, Boston.

MARLBORO, MASS. — The American Broaching Machine Co., recently incorporated with $60,000 capital, has let the contract for a brick, 1-story, 38 x 145-foot factory on Hudson street. A. Thaxter Parsons is interested.

NEW BEDFORD, MASS.—The Gunning Boiler & Machine Co., 67 South Water street, has awarded the contract for a 4-story addition, 36 x 134 feet feet in size, to its foundry and machine shop. C. O. Brighton, 79 North Water street, was the low bidder at the contract price of $6000.

SPRINGFIELD, MASS.—The Economy Ignition Co. has been incorporated with $50,000 capital by Lewis J. Tetlow, John T. Glancey and Wilson Goodrich.

WESTBORO, MASS. — The Warren F. Fraser Machine Co., Brigham street, has let the contract for a brick addition to its plant and will install new machinery.

WESTFIELD, MASS. — The Vitrified Wheel Co. has let the contract for a brick, mill construction, 2-story, 27 x 50-foot addition to its factory on Emery street.

WORCESTER, MASS.—The Baldwin Chain & Mfg. Co., 199 Chandler street, will build a 1-story plant addition 35 x 52 feet in size, to cost $4000.

PROVIDENCE, R. I.—The Rhode Island Tool Co. has let the contract for a brick, 1-story, 50 x 140-foot manufacturing building on West River street.

BRIDGEPORT, CONN.—D. W. Flint, Allen avenue, Providence, R. I., is preparing revised plans for a 3-story plant, 140 x 150 feet in size, to cost $100,000.

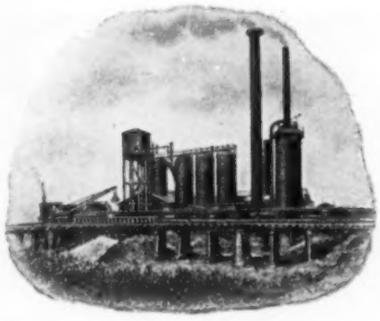
HARTFORD, CONN.—The Hartford Electric Light Co. is building a 100-foot addition to its power plant and will install two new 1250-horsepower boilers and a 10,000 kilowatt steam turbine.

HARTFORD, CONN.—The Pratt & Cady Co. has let the contract for a brick, 3-story, 27 x 100-foot factory building to cost $25,000 on Capitol avenue.

HARTFORD, CONN. — Louis J. Sieling, New York, has been awarded the contract to build a reinforced concrete bridge between Salisbury and North Canaan, Conn. The cost will be $35,000.

MERIDEN, CONN. — Frank Wheeler & Son Inc., has been chartered to build machinery with $100,000 capital by Frank Wheeler, Alfred P. Wheeler, E. W. Robinson and M. H. Wheeler.

STAMFORD, CONN.—The H. & H. Foundry Co. has been incorporated with $15,000 capital. The incorporators are Benjamin Harris, John Hanson, C. Pond Webb and Nicholas Rominello.



DELAWARE RIVER STEEL COMPANY

MANUFACTURERS OF PIG IRON

CHESTER, PENNSYLVANIA

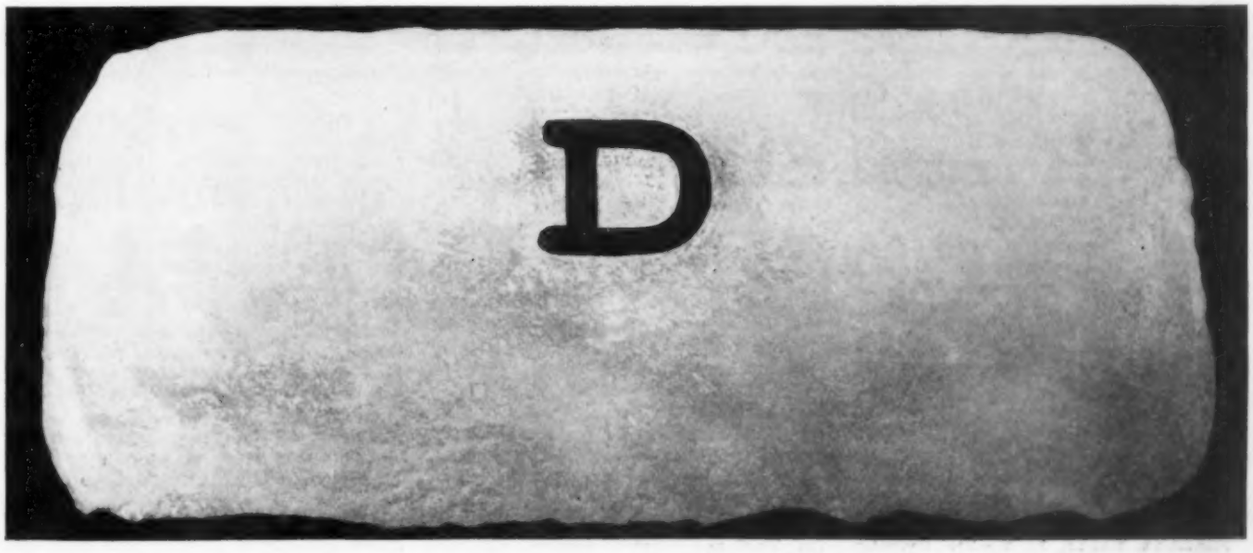
DELAWARE

100 WORDS

To Pig Iron Consumers:

"Delaware" is our brand. We make all grades and sell it under the general name of "Delaware". "Delaware" is part of our stock in trade. We value it greatly and want it indelibly impressed upon your minds. When you think of pig iron think of "Delaware". "Delaware" and pig iron are synonymous. "Delaware" is derived from our location on the Delaware River. No other section can show greater development in the iron trade. Shipbuilding is now so vast that they call us the "Clyde of America". "Delaware" is the key to this message, the most important of our hundred words.

DELAWARE RIVER STEEL CO.



Along the Middle Atlantic Seaboard

AUBURN, N. Y.—The Bowen Products Co. has been incorporated with a capital of $2,500,000 to manufacture engines and motors. The incorporators include E. T. Williams, A. F. Dillman and W. B. Reynolds, 240 West 102nd street.

BROOKLYN, N. Y.—The United American Metals Corp. has been organized with $500,000 capital. The incorporators are R. L. Gray, J. A. Burns, and G. K. Wilson, 82 Washington place.

BROOKLYN, N. Y.—The Morse Drydock & Repair Co., foot of Fifty-seventh street, will build a 1-story compressor building, 36 x 58 feet in size, to cost $5000.

BUFFALO.—The Erie railroad contemplates the erection of a coal handling plant at its Robins works.

BUFFALO.—The Stewart Motor Co. will build a 2-story machine shop, 31 x 110 feet in size at 411 East Delavan street.

BUFFALO.—Fifteen hundred tons of structural steel will be used in building the $1,500,000 destroyer turbine plant now under way for the Bethlehem Shipbuilding Corp. Foundations are being laid for the main building, which will be 200 x 750 feet in size. The company's site covers 15 acres. The Aberthaw Construction Co., Boston, is the contractor.

BUFFALO.—The Shoellkopf Aniline & Chemical Co. has awarded to John W. Cowper & Co. the contract to build an addition, 80 x 120 feet in size, to be known as its Plant No. 80. Three hundred tons of structural steel will be required.

BUFFALO.—The American Car & Foundry Co. is drawing plans for a munitions plant.

BUFFALO.—Farrar and Treffts, 67 Perry street, will build a 1-story power house 30 x 130 feet in size to cost $3500.

BUFFALO.—The Erie railroad has awarded the general contract for repairing its shops to William A. Walker, 583 West Utica street. The work will cost about $10,000.

NEW YORK.—Steven Ranson, 401 West street, has awarded the contract for a boiler shop to Wharton Green, 35 West Thirty-ninth street.

NEW YORK.—The New York Rotary Motor Co. has been organized with a capital of $1,700,000. The incorporators include A. M. Sullivan, H. Meyers and S. S. Meyers, 60 Wall street.

NEW YORK.—The Liberty Equipment Corp. has been organized with $10,000 capital to manufacture machine shop equipment. The incorporators are R. R. Mitchell, F. Leded and O. J. Korb, 27 Cedar street.

NEW YORK.—The Lexay Co. has been incorporated to manufacture automatic machinery. The incorporators are A. Roselman, M. Sindel, and S. V. Heimberger, 299 Broadway.

NEW YORK.—The Gun Corp. has been chartered with $25,000 capital to manufacture machine guns. The incorporators include B. Howie, E. J. Nathan Jr., and M. L. Macauley, 128 Broadway.

NEW YORK.—The Universal Steel & Concrete Co. has been organized with a capital of $10,000. The incorporators are M. and A. S. Rosenberger and J. Kraus, 15 West 107th street.

NIAGARA FALLS, N. Y.—The Hydrofats Co., Inc., 98 Delaware avenue, will build a 1-story plant and power house 57 x 57 feet in size to cost $20,000.

ROCHESTER, N. Y.—The Rochester Light & Power Co. will build a coke storage bin to cost $70,000. The Turner Construction Co., 244 Madison avenue, New York, has the general contract.

ROCHESTER, N. Y.—The Erie railroad will build a $30,000 addition to its machine shops.

SILVER CREEK, N. Y.—The Howes Co. has been chartered with a capital of $250,000 to manufacture machinery and tools. The incorporators are A. C. Barbau, M. L. Barbau and M. A. Barbau.

SYRACUSE, N. Y.—The Dynete Electric Corp., 301 Wolf street, contemplates alterations to its plant.

SYRACUSE, N. Y.—The Misener & Irving Mfg. Co. has been chartered with $50,000 capital to manufacture tools, etc. The incorporators are J. I. Misener, E. V. B. Tyminski and A. Pearsall.

ERIE, PA. — The Miner-Morse Co. has awarded to the Constable Bros. Co. a contract for the erection of a $16,000 warehouse. The building will be brick and steel, 60 x 100 feet in size.

GROVE CITY, PA.—The Grove City Brass & Bronze Co. has been chartered with $25,000 capital by T. A. Sampson, Mercer, Pa.

LEBANON, PA.—The Columbus Chain Co. contemplates enlarging its plant. The company has recently combined with the McKinnon Chain Co., Buffalo.

PHILADELPHIA. — Sklaroff & Sons will build a 6-story 22 x 100-foot addition to their plant at 710-714 South Second street. Plans have been drawn by Frank E. Hahn, architect.

PHILADELPHIA.—The Winfield S. Barnes Co., 1614 Cherry street, will build a 1-story factory and power house 50 x 240 feet in size, to cost $80,000.

PHILADELPHIA. — The Standard Construction Co. has received a contract from the city to build a 1-story concrete and brick power house 44 x 132 feet with middle building 30 x 82 feet and rear building 52 x 210 feet in size. The cost will be $238,000.

PHILADELPHIA.—The Watson Engineering Co., 216 North Broad street, has the contract for the construction of a 1-story machine shop, 215 x 253 feet in size for W. T. White. The cost will be $130,000.

PHILADELPHIA. — The Philadelphia & Reading railroad will build an engine house and machine shop.

PHILADELPHIA. — The Turner Concrete Steel Co. has the contract for erecting a mill house and other additions to the plant of John T. Lewis & Bros. Co., Aramingo avenue, Huntington and Moyer streets.

PHILADELPHIA.—F. A. Toth & Sons will build a boiler house, 1-story, 44 x 50 feet in size, to cost $100,000. Charles H. Casper, 925 Chestnut street, has the general contract.

PHILADELPHIA. — The Bernstein Mfg. Co., Third and Allegheny avenues, will build a 1-story addition to its foundry to be 68 x 96 and 47 x 86 feet in size.

PHILADELPHIA.—The National Galvanizing Co. has been organized with $30,000 capital. Louis Berman is interested.

PITTSBURGH.—The Indian Tool Co. has been chartered with a capital of $35,000 by August Weinman.

READING, PA.—The William F. Rempiss Iron Works has been chartered with a capital of $50,000 by Lambert A. Rehr.

WAYNESBORO, PA.—The Emerson Brantingham Co., Rockford, Ill., will make alterations to its factory, and will also erect a 2-story, 40 x 60-foot foundry building, to cost $12,000. A. R. Warner, 41 East Main street, has the contract.

BLOOMFIELD, N. J.—The Norton Shipbuilding Co. has been chartered with a capital of $250,000. The incorporators are Alfred E. Norton, Carl Nordstron and Elmer E. Wigg.

CAMDEN, N. J.—The New York Shipbuilding Co. has awarded a contract to the J. S. Rogers Co., Moorestown, N. J., for a 1-story brick and concrete warehouse, 85 x 100 feet in size.

CAMDEN, N. J. — The Wilckes-Martin-Wilckes Co., 135 William street, will build a plant and warehouse, 1 and 2 stories high and 110 x 134 feet in size. J. J. O'Leary, Passaic, N. J., has the general contract.

JERSEY CITY, N. J.—The Browns Mills Electric Light & Power Co. has been chartered with $50,000 capital. The incorporators are J. Haviland Tompkins, C. H. Jarvis and John R. Turner.

JERSEY CITY, N. J.—The National Aniline & Chemical Co. has been chartered with $18,959,500 capital to manufacture and deal in chemicals and dyestuffs. The incorporators are J. F. Stone, W. W. McIlray and W. Becker, New York.

JERSEY CITY, N. J.—The Fore Chemical Works has been chartered with $475,000 capital to manufacture and deal in chemicals. The incorporators include M. W. Alexander, R. E. Breed and U. M. Fleischman, Wilmington, Del.

NEWARK, N. J.—The Brown Ferrer Co. Inc. contemplates building a large addition to its plant.

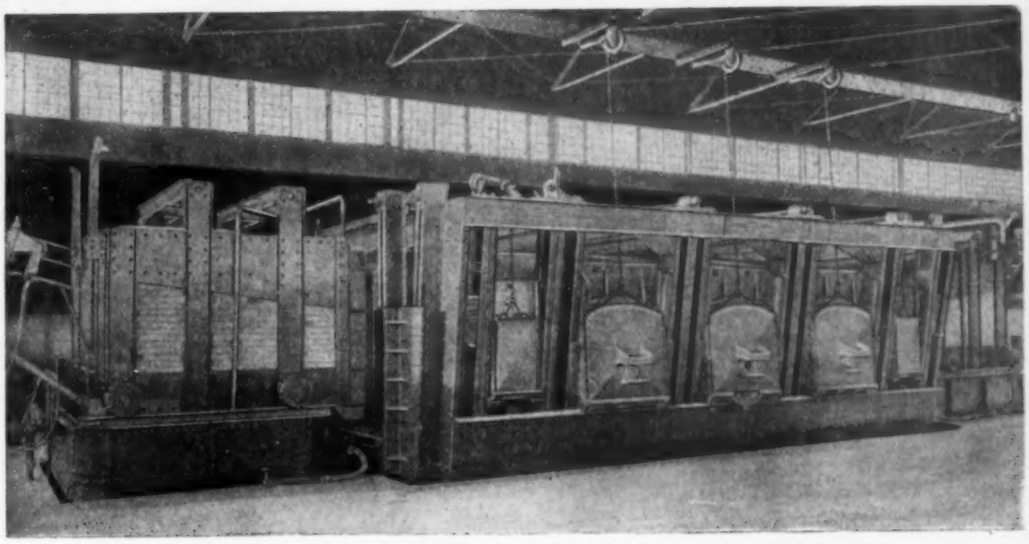
NEWARK, N. J.—The Essex Foundry Co., Murray street and Avenue D, will erect a 1-story brick machine shop, 70 x 114 feet in size, to cost $13,600.

NEWARK, N. J.—The Butterworth-Judson Co., Avenue R, has a permit to build a frame and hollow tile factory, 1-story, 50 x 55 feet, and a frame machine and pipe shop, 1-story, 50 x 90 feet. The total cost will be $18,000.

NEWARK, N. J.—The Heller & Merz Co. will erect two brick factories on Hamburg Place road to be 1-story high and 70 x 200 feet in size. The cost will be $56,000.

NEWARK, N. J.—Charles L. Steinbrenner has prepared plans for a 1-story 30 x 80-foot concrete block factory to be built by Oscar Froehlich, at 676 South Fourteenth street.

NEWARK, N. J.—Eimer & Amend, manufacturers of chemicals, New York, have purchased a factory at 13 Margaretta street and



20-Ton Rolling Type Open Hearth Furnace, Built for the Halcomb Steel Co., Syracuse.

Open Hearth Furnaces

The Wellman-Seaver-Morgan Open Hearth Furnaces are made in such variety of style, size and shape as to supply any of your requirements. **Made by men who know,** they give complete satisfaction.

The rolling type illustrated above is found to be most satisfactory when used as an auxiliary to the electric furnace. The metal is heated and brought to a semi-finished state, then transferred to an electric furnace for finishing off.

The body can be tipped at the exact moment when the metal is of the desired composition and, as no injury is done to the pouring hole by opening and closing, the life of the furnace bottom is correspondingly prolonged.

Get in touch with us when in the market, and learn more about* W-S-M *equipment.

Remember, we are in a position to accept additional tonnage for **Heavy Steel Castings for prompt shipment.**

Principal Products of The W-S-M Company

Steel Plant Equipment:
Manipulators, Furnaces,
Charging Machines, etc.
By-Product
Coke Oven Machinery.
Shipyard Cranes.
Hoisting and Mining
Machinery.
Ore and Coal Handling
Machinery.
Special Large Cranes.
Gas Producers, Gas Valves.
Hydraulic Turbines.
Johnson Hydraulic Valves.
Steel Castings.

WELLMAN
SEAVER
MORGAN
COMPANY
CLEVELAND
OHIO U.S.A

Say you saw it in THE IRON TRADE REVIEW

will make a number of alterations and extensions.

NEWARK, N. J.—The Art Metal Works, 7 Mulberry street, has awarded to William Marrin, 207 Maple street, Kearney, N. J., the contract for a 2 and 4-story plant addition 120 x 132 feet in size, to cost $25,000.

PERTH AMBOY, N. J. — The National Synthetic Co. will build three large additions to its chemical plant to cost $75,000. Tullis & Blanchard, 326 East Forty-second street, New York, have the general contract.

REDBANK, N. J. — The Roberts Safety Watertube Boiler Co. will build a 1 and 2-story plant addition, 80 x 140 feet in size. The H. D. Best Co., 52 Vanderbilt avenue, New York, has the general contract.

DOVER, DEL.—The Dorchester Shipbuilding Corp. has been chartered with a capital of $1,500,000. Those interested are W. I. N. Lofland, George W. Morgan and Frank Jackson.

BALTIMORE.—The Crown Cork & Seal Co., 11511 Guilford avenue, will build a 1-story addition to its power house, 57 x 117 feet in size, to cost $15,000.

RICHMOND, VA. — The Merrill-Stevens Shipbuilding Corp. has been chartered with $5,000,000 capital. The incorporators include James Mullen, president, and Cyrus W. Beale, secretary and treasurer.

Activities in the Central States

APPLETON, WIS.—The Northern Boiler & Structural Works will build a 1-story machine shop addition 100 x 150 feet in size, to cost $35,000.

DE PERE, WIS.—The pattern department of the Lauson-Lawton Foundry Co. has been damaged by fire with a loss of $8000.

EAU CLAIRE, WIS.—The United States Gear Shift Co., recently organized with a capital of $1,500,000, has purchased a site and will start at once to build a manufacturing plant. N. J. Whelan is president.

MADISON, WIS.—The Four Lakes Ordnance Co. has let a contract to the Austin Co., Cleveland, for building a 1-story gun factory, 50 x 150 feet in size. G. A. Steinle is president.

MILWAUKEE.—Henry J. Pauly, 218-220 Fourth street, has started work on the erection of a 2-story machine shop addition, 41 x 48 feet in size, to cost $7500.

MILWAUKEE.—The Milwaukee Forge & Machine Co., 274 Lake street, G. P. Pillar, president, has bought a site and will build a forge shop 75 x 150 feet and a machine shop 65 x 100 feet in size.

MILWAUKEE.—The Liberty Foundry Co. has been organized with $30,000 capital. The incorporators include Gerhard W. Mockley, Edward G. Mockley and Walter J. Buckley.

MILWAUKEE.—In order to provide additional facilities required to fill a government contract for herringbone gears, the Falk Co. will build a large addition to its machine shop and foundry. A contract has been awarded to the Worden Allen Co. for erecting a brick and steel shop 175 x 350 feet in size, to be finished within 90 days. The work will require about 660 tons of structural steel.

SUPERIOR, WIS.—The Superior Iron Works Co. is building a foundry 65 x 100 feet in size, to double its capacity.

TOMAHAWK, WIS. — Plans are being drawn by R. W. Richardson, engineer, St. Paul, Minn., for a pumping station. The equipment will include an electrically driven centrifugal pump of 300 gallons capacity. Building and equipment will cost $20,000.

DETROIT.—The Detroit, Toledo & Ironton railroad, T. Groner, Springfield, O., chief engineer, has bought 76 acres on which it will build a terminal to cost $1,000,000.

DETROIT. — The Burroughs Adding Machine Co. has awarded the contract for a large addition to its factory.

DETROIT.—The Packard Motor Car Co. will build an airplane testing shed and an assembling plant.

VULCAN, MICH.—The Armstrong Shovel Co. has been organized with a capital of $10,000.

CHICAGO.—The Liberty Lock Mfg. Co. has been incorporated with $20,000 capital to manufacture locks. The incorporators are Joseph Jordan, S. E. Briscoe and Charles J. Evans.

CHICAGO.—The Hotpoint Electric Heating Co. plans to build a new plant to cost $250,000. J. R. Richardson, 2240 Ogden avenue, is in charge.

CHICAGO.—The Z-K Airship Co. has been incorporated with $5,000,000 capital to manufacture airplanes. Israel Ziperstein and Michael J. Steffers are the incorporators.

JOLIET, ILL.—The Challenge Spark Plug Co. has been incorporated with $20,000 capital by C. McNaughton, William Heggie and C. L. Mueller.

Government Inquiries

The Navy Department, Bureau of Supplies and Accounts, Washington, D. C., is in the market for the following machine tools:

Five 12-inch high duty engine lathes with 5-foot bed, 1582, no date, Annapolis, Md.

One 16-inch engine lathe with 12-foot bed, 1570, no date, San Diego, Cal.

One 4-foot plain radial drill, 1570, no date, San Diego, Cal.

One horizontal boring and drilling machine, 1567, Dec. 4, Hingham, Mass.

One heavy duty engine lathe, 1569, Dec. 4, Brooklyn, N. Y.

One radial drill, 1570, Dec. 18, San Diego, Cal.

One tool grinder, 1570, Dec. 18, San Diego, Cal.

Schedule numbers and place of delivery follow the specifications of the tools. Further information may be had on application from the Navy Department, Bureau of Supplies and Accounts.

MAYWOOD, ILL.—The Universal Engineering Co., 700 West Twenty-second street, Chicago, is having plans prepared for a 1-story machine shop 60 x 180 feet in size, to cost $15,000.

PEORIA, ILL.—The Keystone Steel & Wire Co. is building a 2-story addition 120 x 150 feet in size, to cost $35,000.

QUINCY, ILL.—The city is planning waterworks improvements to cost $250,000. E. R. Chatten is city engineer.

ANDERSON, IND.—The R. W. G. Foundry Co. has been incorporated with $9000 capital to manufacture gray iron castings. The directors are M. G. Reynolds, John C. Westerfield and Jacob C. Grobfe.

EVANSVILLE, IND.—The Hercules Gas Engine Co. will build an addition to its machine shop and will later enlarge its foundry.

GREENCASTLE, IND.—The Indiana Portland Cement Co., recently organized with $1,000,000 capital, is having plans prepared for a plant. F. L. Smith, 50 Church street, New York, is engineer.

INDIANAPOLIS.—The H. E. Miller Mfg. Co. has been organized with $25,000 capital to manufacture machinery. The incorporators are H. E. Miller, M. Miller and R. D. Burress.

INDIANAPOLIS.—The Bedford Stone & Construction Co. has been awarded a government contract for the construction of a 500 x 1200-foot reinforced concrete and steel warehouse to store aeroplane motors. The cost of the structure will be about $500,000.

INDIANAPOLIS.—The Indianapolis Engineering Co. has been incorporated with a capitalization of $50,000 to manufacture machinery. The directors are Arthur J. Gibbens, William Brandt and Raymond W. Beckman.

INDIANAPOLIS.—The Barger Truck Co. has been incorporated with a capital of $50,000 to manufacture motor trucks of the four-wheel drive type. The incorporators are Henry W. Barger, Walter Brewer and others.

KOKOMO, IND.—A charter has been granted to the United States Tractor Wheel Co., capitalized at $100,000. A. G. Seiberling, general manager of the Haynes Automobile Co., Harry F. Tate and David McCosker are directors.

KOKOMO, IND.—The Printers Machinery Co. has been incorporated with a capitalization of $25,000 to manufacture bookbinding machinery. The directors are Reuben Hawkins, Harrison D. Wilcutts and Harry M. Lynch.

ROCHESTER, IND. — The Rochester Bridge Co. will enlarge its plant and install new machinery to provide for doubling its present capacity. A. L. Denniston is president.

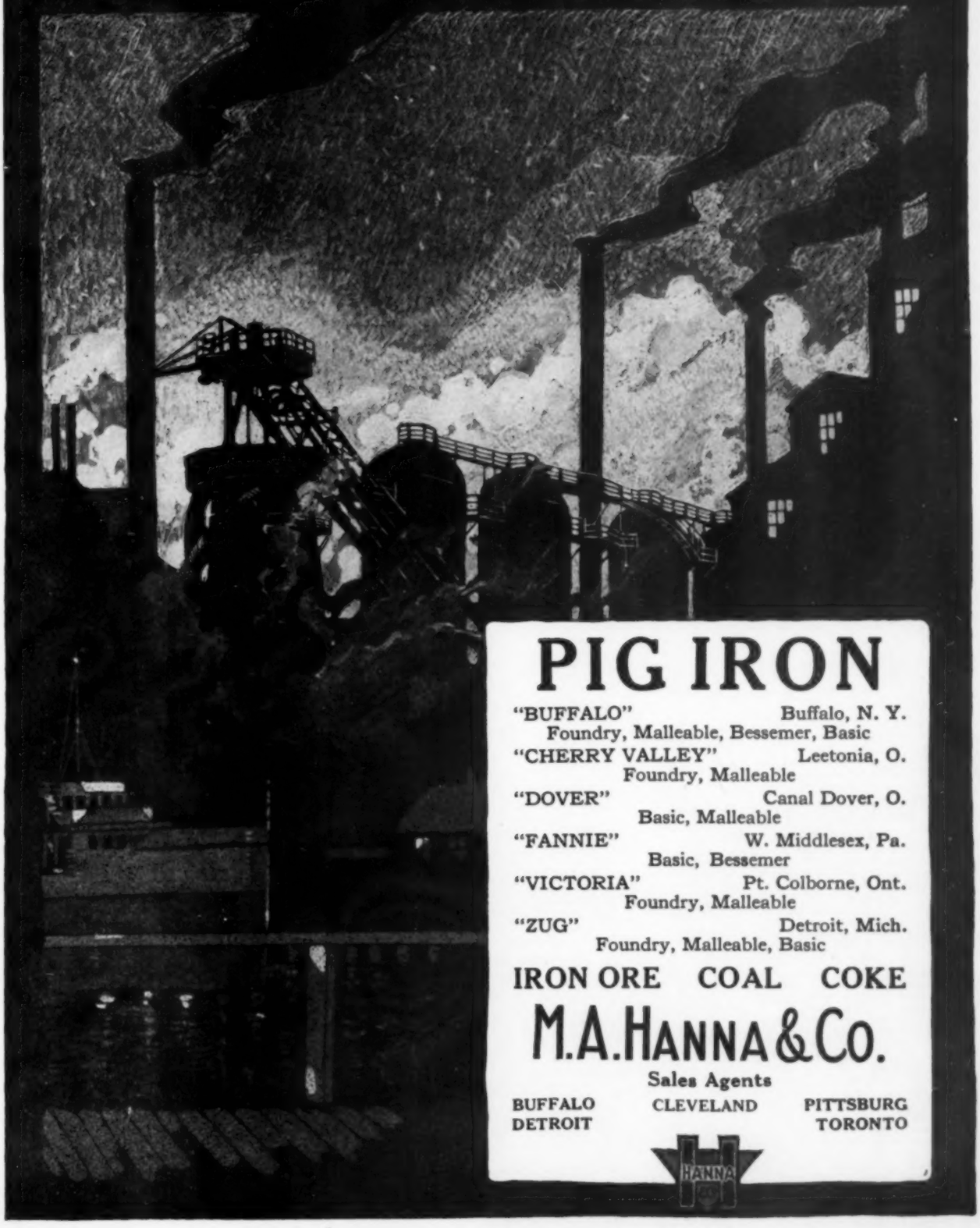
WHITING, IND.—The Great Western Smelting & Refining Co. will add a machine shop 100 x 100 feet in size to its plant.

AKRON, O.—The H. P. Moran Co., 425 Second National Bank building, has the general contract for a boiler house, warehouse and train shed to be built by the Northern Ohio Traction Co. The cost is estimated at $180,000.

AKRON, O.—The O'Neil Tire & Rubber Co. has obtained a permit to build a factory at Talmadge avenue and the Baltimore & Ohio railroad.

AKRON, O.—The Amazon Rubber Co. has had plans prepared for a 1-story factory building on Britain road. The cost will be about $8000. L. J. Schott, East Market street, is president.

HANNA



PIG IRON

"BUFFALO" Buffalo, N. Y.
Foundry, Malleable, Bessemer, Basic

"CHERRY VALLEY" Leetonia, O.
Foundry, Malleable

"DOVER" Canal Dover, O.
Basic, Malleable

"FANNIE" W. Middlesex, Pa.
Basic, Bessemer

"VICTORIA" Pt. Colborne, Ont.
Foundry, Malleable

"ZUG" Detroit, Mich.
Foundry, Malleable, Basic

IRON ORE COAL COKE

M. A. HANNA & CO.

Sales Agents

BUFFALO CLEVELAND PITTSBURG
DETROIT TORONTO

HANNA

Iron and Steel Prices

Corrected to Tuesday Noon

IRON ORE

Superior Ores, Per Ton, Lower Lake Ports.

Old range Bessemer, 55 iron	$5.95
Mesabi Bessemer, 55 iron	5.70
Old range non-Bess., 51½ iron	5.20
Mesabi non-Bess., 51½ iron	5.05

Port Henry Ores, non-Bessemer, Per Unit, Delivered Eastern Pennsylvania.

Old Bed, crude 55 iron	10.50c to 11.00c
Old Bed., concent., 65 iron	11.00c to 11.50c
Harmony, concent., 63 iron	11.50c to 11.75c
Lump (at mines)	$5.75c

WAREHOUSE PRICES

Steel bars, Chicago	4.10c
Steel bars, Cleveland	4.00c
Steel bars, Detroit	4.085c
Steel bars, Philadelphia	4.10c
Steel bars, New York	4.095c
Steel bars, St. Louis	4.17c
Steel bars, Cincinnati	4.08c
Steel bars, St. Paul	4.22c
Steel bars, Buffalo	4.05c
Iron bars, Buffalo	4.65c
Iron bars, Chicago	4.10c
Iron bars, Cleveland	3.95c
Iron bars, Detroit	4.75c
Iron bars, St. Louis	4.17c
Iron bars, Cincinnati	4.08c
Iron bars, Philadelphia	4.50c
Iron bars, New York	4.659c
Shapes, Chicago	4.20c
Shapes, Detroit	4.185c
Shapes, St. Louis	4.27c
Shapes, St. Paul	4.32c
Shapes, New York	4.195c
Shapes, Cleveland	4.10c
Shapes, Philadelphia	4.20c
Shapes, Buffalo	4.15c
Shapes, Cincinnati	4.18c
Plates, Buffalo	4.40c
Plates, Chicago	4.45c
Plates, Detroit	4.435c
Plates, St. Louis	4.52c
Plates, St. Paul	4.57c
Plates, New York	4.445c
Plates, Cleveland	4.35c
Plates, Philadelphia	4.45c
Plates, Cincinnati	4.43c
No. 10 blue anl. sheets, Chi.	5.45c
No. 10 blue anl. sheets, Cleve.	5.00c
No. 10 blue anl., Buffalo	5.40c
No. 10 blue anl., shets, St. L.	5.52c
No. 10 blue anl. sheets, Cinci.	5.43c
No. 10 blue anl. sheets, St. Paul	5.57c
No. 10 blue anl. sh., Detroit	5.435c
No. 28 black sheets, Chgo.	6.45c
No. 28 black sheets, Cleve.	6.35c
No. 28 black sheets, Cinci.	5.45c
No. 28 black, Detroit	6.435c
No. 28 black sheets, St. L.	6.52c
No. 28 black sheets, St. Paul	6.57c
No. 28 galv. sheets, Chgo.	7.70c
No. 28 galv. sheets, Cleve.	7.60c
No. 28 galv. sheets, Cinci.	6.65c
No. 28 galvanized, Detroit	7.685c
No. 28 galv. sheets, St. L.	7.77c
Hoops, Cleveland	8.00c
Hoops, Detroit	6.50c

IRON AND STEEL SCRAP

STEEL WORKS USE

(Gross Tons)

Bundled sheets, Pittsburgh	**$22.00 to 23.00**
Bundled sheets, Cleveland	**21.25 to 22.00**
Bundled sheets, Buffalo	**19.00 to 20.00**
City wrought, short, N. Y.	24.00
Frogs, switches, guards, St. L.	29.00 to 29.50
Heavy melting steel, Pitts.	30.00
Heavy melting steel, Buffalo	29.00 to 30.00
Heavy melting steel, Chgo.	28.50 to 29.50
Heavy melt'g steel, Cleveland	28.50 to 29.50
Heavy melting steel, Cinci.	25.00 to 25.50
Heavy melting steel, east. Pa.	26.00 to 28.00
Heavy melting steel, N. Y.	25.00 to 25.50
Heavy melting steel, St. L.	29.00 to 29.50
Heavy melting steel, Birming.	21.50 to 22.50
Hydraulic press. sheets, Cleve.	24.50 to 25.00
Hydraulic press. sheets, Pitts.	**24.00 to 25.00**
Hydraulic press. sheets, Chgo.	24.00 to 25.00
Low phos. steel, Buffalo	39.00 to 40.00
Low phos. steel, Pittsburgh	**38.00 to 40.00**
Low phos. steel, eastern Pa.	35.00 to 37.00
Shoveling steel, Chicago	27.50 to 28.00
Shoveling steel, St. Louis	27.00 to 27.50
Steel rails, short, Chicago	34.00 to 34.50
Steel rails, short, Cleveland	31.00 to 31.50
Steel rails, short, St. Louis	36.50 to 37.00
Steel rails, old, Birmingham	26.00 to 28.00
Stove plate, Cincinnati	16.00 to 16.50
Stove plate, St. Louis	16.50 to 17.00
Stove plate, N. J. points	19.50 to 20.00
Stove plate, Birmingham	17.50 to 18.00
Stove plate, Buffalo	20.00 to 21.00
Stove plate, eastern Pa.	22.00 to 23.00
Stove plate, Cleveland	19.00 to 20.00
Stove plate, Pittsburgh	**20.00 to 21.00**
Cast iron borings	11.00 to 12.00

(Net Tons)

Boiler plate, cut, No. 1, Chgo.	$19.00 to 20.00
Boiler plate, cut, No. 1, St. L.	18.50 to 19.00
Bundled sheets, Cincinnati	17.00 to 17.50
Knuckles, coup., Chicago	32.00 to 33.00
Knuckles, coup., St. Louis	30.50 to 31.00
Springs, Chicago	37.50 to 38.00
Stove plate, Chicago	18.00 to 18.50

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:	
Cleveland	$0.95
Newark, N. J.	3.50
Boston	3.70
Philadelphia	3.30
Pittsburgh	.95
St. Louis	3.18
Minneapolis, St. Paul	4.54
Buffalo to:	
Albany, N. Y.	$1.26
New England (rail)	3.10
New York and Brooklyn (rail)	3.10
Virginia furnaces to:	
Philadelphia	$3.27
New England	3.77
Brooklyn, Jersey City, Newark	3.32
Birmingham, Ala., to:	
Boston	6.00
Cincinnati	2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
Minneapolis, St. Paul	5.85
New York (r. and w.)	6.00
Philadelphia (r. and w.)	5.25
Pittsburgh	4.90
Savannah, Ga.	2.75
St. Louis	3.40
Chicago to:	
Des Moines	$2.80
Milwaukee	.50
Minneapolis, St. Paul	2.00
Moline, Ill.	1.15
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58
Minneapolis, St. Paul	4.54
Duluth, Minn., to:	
Minneapolis-St. Paul	$1.25
Mayville, Wis.:	
Minneapolis-St. Paul	$1.75

Freight Rates, Finished Material

Pittsburgh, carloads, per 100 lbs., to:	
New York	19.5 cents
Philadelphia	18.5 cents
Boston	21.5 cents
Buffalo	16.0 cents
Baltimore	18.0 cents
Cleveland	13.5 cents
Cincinnati	17.0 cents
Chicago	21.5 cents
Detroit	15.7 cents
Minneapolis and St. Paul	32.9 cents
Denver	79.0 cents
St. Louis	27 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast (all rail)	75 cents
Pacific coast (tin plate)	75 cents

IRON MILL USE

(Gross Tons)

Busheling, No. 1, Cleveland	25.75 to 26.75
Busheling, No. 1, Buffalo	**25.00 to 26.00**
Busheling, No. 2, Buffalo	17.00 to 18.00
Busheling, No. 1, Pittsburgh	**21.00 to 22.00**
Cast borings, New York	17.50 to 18.00
Cast borings, eastern Pa.	19.00 to 20.00
Cast borings, Cleveland	18.00 to 18.50
Cast borings, Buffalo	19.00 to 20.00
Cast borings, Pittsburgh	20.00
Cast borings, Birmingham	11.00 to 12.00
City wrought, long, N. Y.	29.00 to 30.00
Forge flashings, small, Cleve.	23.50 to 24.00
Forge flashings, large, Cleve.	22.00 to 23.00
Forge No. 1, Eastern Pa.	22.50 to 23.50
Grate bars, Buffalo	20.00 to 21.00
Grate bars, Cleveland	19.25 to 20.50
Grate bars, N. J. points	19.50 to 20.00
Iron axles, Pittsburgh	42.00 to 44.00
Iron axles, Cincinnati	42.00 to 42.50
Iron axles, Cleveland	49.50 to 50.00
Iron axles, eastern Pa.	50.00 to 55.00
Iron axles, Chicago	36.00 to 37.00
Iron rails, Chicago	36.00 to 37.00
Iron rails, Buffalo	37.00 to 38.00
Iron rails, Cincinnati	32.50 to 33.00
Iron rails, St. Louis	35.50 to 36.00
Iron rails, Cleveland	40.00 to 40.50
Machine turnings, Cleve.	18.00 to 18.50
Machine turnings, Buffalo	18.00 to 18.50
Machine turnings, N. Y.	16.50
Machine turnings, Pitts.	20.00
Machine turnings, east. Pa.	18.00 to 19.00
Machine turnings, Birming.	17.00 to 18.00
Pipes and flues, Cleveland	23.75 to 24.75
R. R. mch. cast, No. 1, Buff.	27.00 to 28.00
R. R. wrgt. No. 1, Buffalo	34.00 to 35.00
R. R. wrgt., No. 1, east, Pa.	35.00
Railroad wrgt., No. 1, Cleve.	33.50 to 34.50
R. R. wrought, No. 1, Pitts.	35.00
R. R. wrgt. No. 1, Birming.	26.00 to 28.00
Wrought pipe, Buffalo	26.00 to 27.00
Wrought pipe, eastern Pa.	30.00 to 32.00
Wrought pipe, New York	29.00

(Net Tons)

Angle bars, iron, Chicago	$35.00 to 35.50
Angle bars, steel, St. Louis	25.00 to 26.00
Arch bars & transoms, St. L.	42.00 to 42.50
Arch bars & transoms, Chgo.	36.50 to 37.50
Busheling, No. 1, Chicago	24.00 to 25.00
Busheling, No. 1, Cincinnati	**21.00 to 21.50**
Busheling, No. 1, St. Louis	22.50 to 23.00
Busheling, No. 2, Chicago	16.50 to 17.00
Cast borings, Cincinnati	13.00 to 13.50
Cast borings, St. Louis	16.50 to 17.00
Cast borings, Chicago	17.00 to 17.50
Cut forge, Chicago	29.00 to 29.50
Iron axles, St. Louis	44.00 to 44.50
Iron axles, Chicago	45.50 to 46.50
Machine turnings, Chgo.	17.00 to 17.50
Machine turnings, Cinci.	13.00 to 13.50
Machine turnings, St. L.	16.75 to 17.25
Pipes and flues, Chicago	21.50 to 22.50
Pipes and flues, St. Louis	21.50 to 22.00
Railroad wrgt., No. 1, Chgo.	31.00 to 32.00
Railroad wrgt., No. 1, Cinci.	28.50 to 29.00
Railroad wrgt., No. 1, St. L.	31.00 to 31.50
Railroad wrgt., No. 2, Chgo.	29.00 to 29.50
Railroad wrgt., No. 2, St. L.	29.00 to 29.50

IRON OR STEEL WORKS USE

(Gross Tons)

Axle turnings, Cleveland	**$22.00 to 23.00**
Axle turnings, Buffalo	**25.00 to 26.00**
Shafting, New York	34.00
Shafting, eastern Pa.	38.00 to 40.00
Steel car axles, Birmingham	32.00 to 33.00
Steel car axles, New York	46.00
Steel car axles, Buffalo	45.00
Steel car axles, Cleveland	46.00 to 47.00
Steel car axles, Pittsburgh	**40.00 to 42.00**
Steel car axles, eastern Pa.	50.00 to 55.00

(Net Tons)

Shafting, St. Louis	30.50 to 31.00
Steel car axles, St. Louis	42.50 to 43.00
Steel car axles, Chicago	41.00 to 42.00

IRON FOUNDRY USE

(Gross Tons)

Car wheels, (iron), Pitts.	**30.00 to 31.00**
Car wheels, (steel), Pitts.	**33.00 to 35.00**
Car wheels, eastern Pa.	33.00 to 35.00
Car wheels, Buffalo	**30.00 to 31.00**
Car wheels, Chicago	29.00 to 30.00
Car wheels, St. Louis	27.50 to 28.00
Car wheels, Birmingham	25.00 to 30.00
Car wheels, Cleveland	26.00 to 26.50
Tram car wheels, Birming.	20.00 to 25.00
Cast, No. 1, Birmingham	22.50 to 25.00
Cast, 1, machy., N. J. points	32.00 to 33.00
Cast No. 1, Cleveland	24.75 to 25.50
Cast, 1, heavy, N. J. points.	30.00
Cast, No. 1, eastern Pa.	31.00 to 33.00
Cast, No. 1, Pittsburgh	28.00 to 29.00
Malleable railroad, Cincinnati	**20.50 to 21.00**
Malleable railroad, Cleveland	27.00 to 27.50
Malleable railroad, Buffalo	**28.00 to 29.00**
Malleable railroad, Pittsburgh	**28.00 to 29.00**
Malleable railroad, east. Pa.	**30.00 to 32.00**

(Net Tons)

Cast, No. 1, Chicago	24.00 to 24.50
Cast, No. 1, Cincinnati	24.50 to 25.00
Cast, No. 1, St. Louis	21.50 to 22.00
Malleable railroad, Chicago	27.00 to 27.50
Malleable railroad, St. Louis	25.00 to 26.00
Malleable agricultural, Chgo.	23.50 to 24.50

MISCELLANEOUS USES

(Gross Tons)

Reroll. rails, 5 ft. & ov., Pitts.	**$34.00 to 36.00**
Reroll. rails, 5 ft. & ov., Chgo.	35.50 to 36.50
Reroll. rails, 5 ft. & ov., E. Pa.	34.00 to 37.00
Reroll. rails, 5 ft. & ov., St. L.	35.50 to 36.00
Reroll. rails, 5 ft. or ov., Cleve.	37.00 to 38.00
Rerolling rails, long, Birming.	37.50 to 38.50

(Net Tons)

Boiler punchings, Chicago	31.50 to 32.00
Locomotive tires, Chicago	35.00 to 36.00
Locomotive tires, St. Louis	32.50 to 33.00